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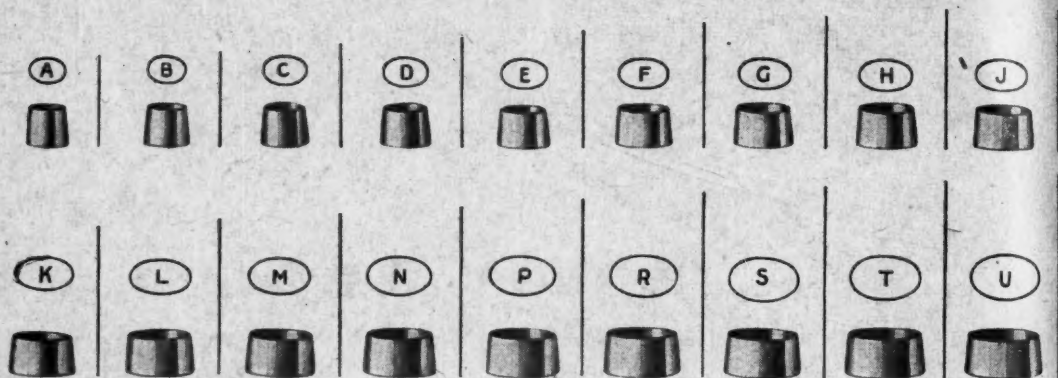
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## ORIGINAL ARTICLES

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### MUSCLE FUNCTION, ITS EFFECT ON OSSEOUS DEVELOPMENT, AND ITS RELATION TO ORTHODONTIC TREATMENT\*

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BY HOMER B. ROBISON, D.D.S., HUTCHISON, KANSAS

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THE attitude of the orthodontist toward the subject of muscle functioning, the feasibility of its developing muscles, and its bringing about a harmonious functioning of its neighboring organs remind one of religion. No one will decry its virtue or dispute its value, and all will heartily agree that it is good for humanity, but you cannot get very many to apply it.

Why should this condition exist? On numerous occasions I have asked different physiologists and anatomists if they know of any muscles (barring certain types of injury, and it is surprising how successfully scar tissue can be broken up and converted into a more plastic state) that will not develop under proper functional activity, and their answers are always in the negative. This was emphasized by Mr. Pond when he stated, "Compositional as well as structural changes in bones appear to be related to change in function, and this fact should direct our attention to the importance of the reciprocal relation between function and structure. The study of old bones is limited in its value, and particularly is this true when we search for the structural and compositional elements which suffer alteration with changes in function and advancing age."

There are many logical reasons why this condition exists; the most prevalent one is the lack of cooperation of the patient, and unquestionably this is the most important and the most exasperating to the operator, but in most instances where cooperation is lacking, the fault lies with the orthodontist, for he does not sell himself on its importance, and it is obvious that he will not

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\*Section of symposium on muscle function read at the Twenty-eighth Annual Meeting of the American Society of Orthodontists, July 15-20, 1929, Estes Park, Colo.

emphasize its importance to the patient. To present this subject properly one must be familiar with the anatomy and the physiology of the muscles of the face, neck, and throat and of their synergy. Patients, as a rule, are willing to cooperate and when told to function certain muscles (granting you are familiar with the existing needs) will always function the ones that are developed or partially so.

This will be ably demonstrated by the motion pictures which Dr. Logan will present. I hope you will follow them closely, for he will demonstrate the evil results that might ensue and show how he assisted the patient in mastering it.

I would not be interpreted as saying that muscle exercises will in all cases correct malocclusion; in fact the cases I shall illustrate are those in which it will be only a great aid to our mechanical appliances. The trouble is that many orthodontists do not realize when a case is finished. They pay little attention to the relative harmony of the different parts of the cranium. Some will argue that all this is unnecessary; they state that when the teeth are placed in their proper occlusion the muscles will adjust themselves; suffice it to say that this is true in some few instances, while in the larger majority it is not. But even in these few instances normalization might be brought about but would it not be infinitely better to keep the surrounding tissues developing in conjunction with the arches.

This is the possible reason for the era of extraction of some years ago, particularly of premolars, and which is again coming somewhat into vogue. I do not wish to be quoted as saying that extraction is not justifiable in some instances, but in those instances it should be used as a matter of compromise. The enormous length of time that would be required to bring about a normal condition in many of our older patients, because of the extreme deformity, might render extraction justifiable, but in most instances it is an indifferent way of dealing with the situation.

There are many phases of deficiencies that affect the body as a whole, and we are too prone to regard dental anomalies as local conditions. In the majority of instances we are dealing with individuals who are more or less rachitic. Too often rickets are considered rickets when the child can no longer walk, because his bones are so soft they present a halisteresis or mashing down of the joints to the extent that they are not able to carry the weight of the body. In its incipient state it is popularly called growing pains; the laity will say that is perfectly normal, as most all growing children have them. The truth of this statement is evidenced by the fact that our state is attempting to treat all deformed children, particularly stressing club feet. If 85 per cent of all people had one or more of the various anomalies which the orthopedist is called upon to treat, as is the case with dental arches, then it would be looked upon as approaching normal. It is high time that we and our allied professions wake up to the fact that it is our duty to educate the public along many lines, but particularly to the fact that because the majority of people have certain types of deficiencies, that does not make those individuals normal; this should not be a case of the majority ruling.



We also fail to realize that in these cases we have a rachitic condition of the muscles or a deficient calcium content, a fact that was so ably brought out by Mr. Pond. "Studies of metabolism have indicated that the bones are incessantly tapped for calcium by other tissues of the body and that the bony structure is being altered during health as well as during disease. We have long known that compact bone is giving way to trabecular bone in certain areas. All these changes and other apparent ones are but an index of the sublime alterations of structure and composition; hence we may state that bone, as it fits into the scheme of the body economy, is a functional mass, in a state of flux, quite dependent upon its functions and the functions of associated tissue." Which makes it evident that suffering from rickets would of necessity cause an inert muscular system which may or may not be associated with an inert mind, and it is frequently accompanied by a lack of coordination very much the same as in the case of a stutterer. It is also closely related to the type of insanity called dementia precox and usually of the hebephrenic type, which is further called mind or will-block, where the patients will attempt to do as ordered but the nerve impulses fail to direct, so they only sit, if told to arise they cannot, but if one places one finger under their arms and lifts as much as an ounce, they will rise. The same procedure will enable them to walk, but they cannot turn without a slight suggestion of aid. A large percentage of people are at times affected by mind or will-block, and our patients who are at times affected thus should, it is quite evident, be given careful consideration at this stage of their visits.

These and many other phases are so essential to success that we must familiarize ourselves with the conditions and the needs of the muscles as already indicated, which will do wonders in assisting a patient to function the proper ones. It is stated that the greater percentage of our education is obtained by observation, therefore we must show them.

The subject dealing with the various characteristics is worthy of due consideration also, as are the definite stigma that they leave on the face and the body as a whole, but time will not permit our going into this phase at this time.

A great deal more could be said upon the fundamentals of muscular development; in fact all my allotted time could easily be spent on this phase alone. Even though the time would permit, Dr. Rogers has on various occasions covered this phase of it much more thoroughly and completely than I could do. I should like to refer you especially to a paper given at Buffalo and appearing in the *INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY*, January, 1929. While my ideas differ from his in some instances, I feel that it will be largely a matter of different interpretation. Possibly the most varied opinion is in the use of the pterygoid muscles for extrusion of the mandible. In my opinion if that is practiced to any extent, especially where the glenoid fossa is developed to any degree of maturity, there is a likelihood of flattening the condyle and fossa, as I shall attempt to show you has been done in some skulls.

There may be other slight deficiencies, but on the whole the object of this theme is not to tear down but rather to emphasize further the vast importance

of muscle functioning, as Dr. Rogers has done many times, and I am sure he will agree that it is not being practiced as it should be. Therefore my one aim is to give you something in the form of a demonstration that may help further the cause, and if I succeed even to a small degree I will feel that my efforts have been well spent.

I shall attempt to point out some of the various types of muscular deficiencies, how to correct them, and how to prevent our patients from functioning the ones that are already developed.

To enable us to visualize better the normal draperies of the cranium we will briefly review its anatomy. We are all familiar with Fig. 1, a skull at birth. It presents several points of interest: the short vertical diameter, the thin bone forming the floor of the nose and the roof of the mouth, the inferior turbinates lying nearly on the floor, the absence of all sinuses, except a slight trace of the maxillary.

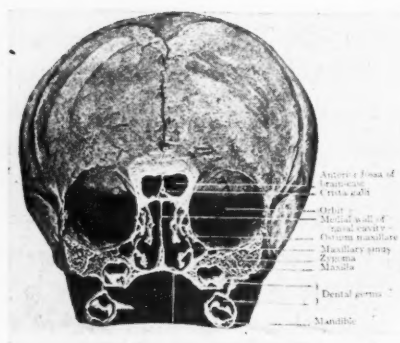


Fig. 1.



Fig. 2.

Fig. 2 is of an adult showing the downward growth of the face, the turbinates being well away from the floor and the advent of the sinuses. Note the increased vertical growth from the floor of the orbit to the roof of the mouth.

Fig. 3 is a drawing by Brady which illustrates the evolution of the skull and the relative growth of the different parts. You will especially note that the greater amount of growth is in the inferior anterior portion, an important factor in dealing with dental anomalies and the portion to which the more important muscles are attached; in fact, the greater portion of the skull's growth from birth is in the region of the accessory sinuses to the nose and the voluntary muscles of the cranium.

Fig. 4 shows the muscles of the face and Fig. 5 those of the throat. I shall briefly suggest a method of functioning these muscles, starting with those of the nose, dilator naris, posterior and anterior; these I consider most important, for without their functioning the breathing is impaired; and we all know what a failure orthodontic treatment is without a normal breathing



apparatus. They can, therefore, well be called the key to the situation; they control the alien cartilages when properly developed which act as shutters opening under forced breathing and subsiding when at rest. The next is that of blowing under the upper lip, and while air is still under use depressor naris to force lips down. This is indicated in cases of short upper lip and where there is a considerable deficiency in bone growth, as in cases sometimes erroneously called anterior occlusion where the mandible is normal and the maxilla undeveloped, this exercise together with forced breathing will rapidly change the aspect.

The next, a group of six, are less important. They are first, the levator labii superioris alaeque nasi; it is functioned as in saying "smarty."

The levator labii superioris, and levator anguli oris function somewhat simultaneously, as in winking with the lateral inferior portion of the eye.

The zygomaticus major and minor function in wrinkling the upper lateral portion of the face.

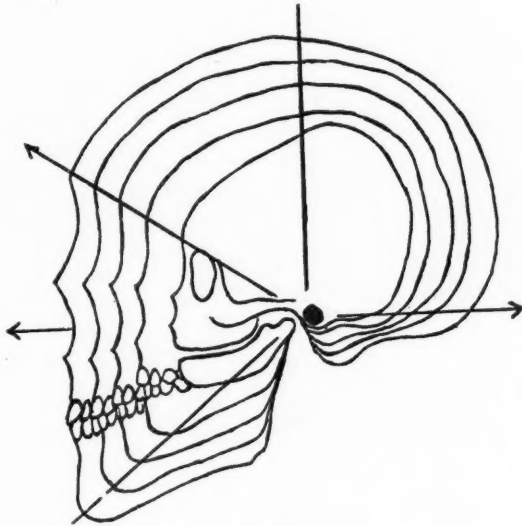


Fig. 3.

The risorius functions in spreading the corner of the mouth, which might be termed as a silly or idiotic grin.

The next series will be those attached to the lower half of the inferior orbicularis oris and below, the depressor inferior anguli oris, is functioned as in a boy trying to look tough.

The depressor menti as used in cases of extreme nervous strain.

The superior hyoid group can be functioned somewhat separately by dropping the posterior portion of the tongue. The inferior group can be functioned by raising and lowering the hyoid bone, but they can be best developed by using all the inferior muscles more or less in conjunction.

The muscles of the neck, particularly those of the posterior position, can be well developed by using any of the wrestlers exercises but especially the ones where they lie on their back and raise the body with the knees and neck and then pivot the body on the neck. Wrestlers and athletes often use fifty



of the orbicularis oris by producing a rotating motion of the lips, thus bringing all its correlated muscles into play.

Fig. 6 is quite typical of the mouth breather, adenoid and tonsil sufferer, but curiously enough the history shows that both the patient's adenoids and her tonsils had been removed one year previously, doubtless with the customary assurance that it would correct her mouth breathing. A glance at her picture will tell you more than I can. It is quite a question just what brings about this listlessness, particularly the sad and dreary appearance that is usually present below the eyes. Unquestionably the dry condition of the mouth which reverses the function of the mucous membrane, the hypertrophied and usually infected condition of the nose which frequently affects the hearing, and the psychic effect that the parents, teacher, or in fact any one who may have any legal right to be continuously telling them, to shut their mouths, when they know that it would merely mean suicide, may wholly or in part be responsible for the condition. The natural reaction to such a com-



Fig. 6.

mand must be one of two things, either a fighting resentment or to give up in despair.

This is a type of case where really all the muscles are or soon would be impaired. I would recommend especially the developing of the naris muscles, paying particular attention to the depressor naris. My observation has been that the orbicularis oris is not so deficient in cases of short upper lip but that the attached muscles are lacking in function.

If we have enough of this type, we will always have patients, for with some of them it is almost an endless procedure to induce them to function the proper muscles sufficiently, not that they could not be readily treated, but they have a muscular and sometimes mental inertia that must be overcome.

Figs. 7 and 8 are of a case quite interesting from a great many angles. In all cases as a matter of diagnosis we should observe closely to determine the type with which we are dealing. This young lady was designed to have a somewhat slender face, one that would fit Dr. Bennet Bean's classification of hypermorph fairly well, the type that is highly intelligent and very efficient along some particular line. However, if we were judging from the existing condition below the malar bone our diagnosis would doubtless be



incorrect, but if our attention is placed on that above the malar bone then drawing in your mind's eye the width of the lower face as it should be to harmonize with the upper, the correct symmetry can be fairly well determined. Note the change in the width of the lower portion of the face. In spite of the fact that she had a complete bilateral posterior occlusion and with extreme narrowing of both arches, she still possessed a fairly normal breathing appa-



Fig. 7.



Fig. 8.

ratus. You will note that the lips, alien cartilage, levator labii and naris muscles, and sinuses all show signs of functioning. The high nose can doubtless be attributed to an effort at compensation, that is the height compensated to some extent for the lack of width.

The pride and alertness individuals of this type have, cause them to keep the lips over the teeth and likewise create a synergy of the muscles. There should be no difficulty encountered in securing cooperation in this type.

Another interesting point is the neck; it is again evident that this type

is designed to have a longer neck than the broader faced type, but it should also be evident that the neck muscles are more deficient than those of the face, and by diligent exercise of the abdominal and neck muscles the neck will appear much shorter. You will also note that it has nearly hidden the pomum Adami.

Fig. 9 is that of a boy four years of age; this is a further study in facial symmetry. You will note the lowness in the bony portion of the nose, also the apparent lack of development of the chin. These points are apparently normal at this age. The anterior development of the nose seems to be in keeping with advancing mentality. Stanton has made a very valuable contribution on this subject in his text, "Face and Form Reading." Doubtless, it is influenced by the advent of the ethmoidal sinuses which are purely a product of advancing civilization. Reichwulste states that "the



Fig. 9.

ethmoidal sinuses are found only in man and the anthropoid ape." However, this chap was evidently advancing properly, for according to the Simon Binet Mental Test his I.Q. was 131. I mention this merely as another aid in diagnosis as well as a note of warning, that we should take the chronologic age of the patient and the fact that there are no sinuses at birth into consideration, and thus avoid an embarrassing situation arising from an incorrect diagnosis.

Fig. 10 is of a young lady about seventeen years of age; this is quite an interesting as well as a pathetic case. As is commonly the case the patient's parents realized that her breathing was impaired, so consequently they journeyed to a larger city to consult a rhinologist, going to one after another; each time the rhinologists operated and accordingly assured them that that particular operation would perfect the marvelous cure. Finally after nearly everything about her nose and throat was removed that was removable (in-

cluding the pathetic practice of removing the turbinates, which fortunately is now but seldom done by reputable men), seeing that she was still unable to breathe through her nose they finally called on a man at home who told them that the obstruction was caused by the narrow arch. This experience can be likened unto the search for the Holy Grail.

These are very difficult cases to handle, for when the bony framework has been pretty well demolished, we have but little to work with; however, this case has exceeded my expectations, and the breathing is gradually improving, which she says enables her to breathe entirely through her nose. However, I am quite sure it is not sufficient to supply her in case of strenuous exercise, but the case is not yet completed, and hope is still maintained that it may enable her to breathe quite normally under most circumstances. The chief exercises in a case of this sort are all the muscles above the mouth, particularly the blowing under the upper lip and especially stressing the forced breathing.



Fig. 10.

Figs. 11 and 12 are of a young man fifteen years of age. This is a unilateral posterior occlusion right. The time that had elapsed between photographs was about three years. The muscles apparently were sufficiently developed to retain the teeth in position. However, the case could hardly be called completed, as pathology was present at the apices of the first right molar; it was removed and the second molar was being brought forward, hence, the lack of development in the region of the mental eminence. But on the whole this type is not nearly so difficult to treat. While it would appear that his upper lip was short in the beginning, still a further study of it will reveal that in an effort to cover the teeth it has been developed, and when the anterior teeth were reduced, the lip was nearly of sufficient length to cover it. This condition is usually found in cases where the patients are quite conscious of their appearance and have sufficient pride to attempt to hide the conspicuousness of the teeth. One will usually receive much better cooperation in this type of individual.



Another unusually striking thing is the nearly normal nose. I wish again to repeat that there is nothing of as great an aid to orthodontic treatment as a normal breathing apparatus.

The change in dress and appearance was not premeditated, it was largely due to a different aspect on life. Also we must give his access to plenty of

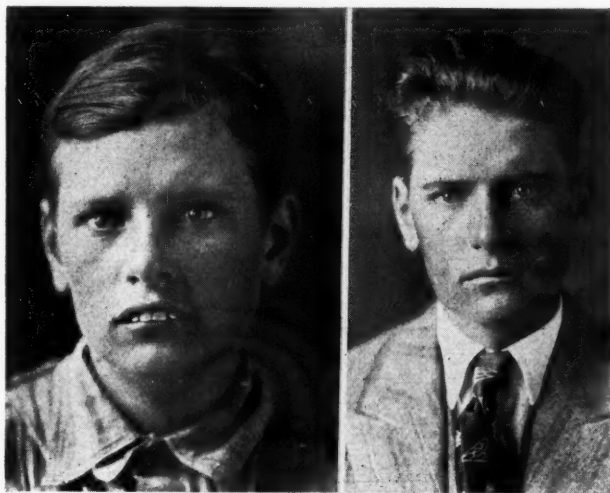


Fig. 11.



Fig. 12.

good sunlight and wholesome food some credit for its helpful influence. While it was necessary to tone nearly all the muscles, I am inclined to believe that cases of this type might normalize themselves, which gives the disbeliever in muscle functioning grounds for argument. Even in the few cases of this type I am sure that coaching them on functioning will shorten the duration of treatment.

Fig. 13 is of a young woman fifteen years old, a very appreciative and considerate girl. It is plain that there was some evidence of hyperthyroidism, and she was also quite conscious of her appearance. It is also evident that the maxillary anterior teeth occluded posterior to the mandibular anterior teeth, but it was not an anterior occlusion.



Fig. 13.



Fig. 14.

The chief exercises required in this case were blowing under the upper lip and forcing it down with the depressor naris, also considerable forced breathing was required. Please note the development in the nasal region, also how well the cartilaginous portion of the nose is raising and the alien cartilage has improved vertically; there has been some development since the last photograph was taken.

This is a type that could be erroneously diagnosed as anterior occlusion, but as a matter of fact I have seen very few true anterior occlusions. But most of the cases that present this stigma present a deficiency of the maxilla and not an accelerated growth of the mandible.

Fig. 14 is a striking example of what can be done in ten months by concentrated efforts. This no doubt is due mainly to the special exercises, some of which I have previously mentioned and also to the hammering on the chin that pugilists are subjected to. His weight advanced from one hundred seventy-five pounds to nearly two hundred in this time. There can be no doubt as to his future with such efforts.

I am indebted to Lew Cutler, his promoter, for permission to use these photographs, and it is through the courtesy of C. S. Morris of the *Daily Oklahomian* that I secured the photographs.

And finally, as I have stated many times before and of which I am more than ever convinced, there is no undeveloped muscle that cannot be developed, and the degree of success will depend upon our ability to instruct and the patient's willingness to cooperate.

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## A HELPFUL POINT OF VIEW\*

BY ALFRED PAUL ROGERS, D.D.S., BOSTON, MASS., DR. W. R. DINHAM, SEATTLE, WASH., AND DR. H. L. LOGAN, MOUNT CARMEL, PA.

BY ALFRED PAUL ROGERS, D.D.S., BOSTON, MASS.

IN WRITING for this occasion I have found some difficulty in determining just how to approach the subject under discussion in the most profitable way. It seems to demand, vaguely, an answer to numerous questions. It appears to denote that the time has arrived when an awakening interest demands a uniform understanding of the theories and methods of practice of the "newer orthodontics"; but to determine in advance just what type the questions might be, presented difficulties which I have felt incapable of definitely determining. There are some who seem to have a very fair appreciation of the value of the work we are considering this morning—an appreciation which has been heightened by a successful practical application of the principles which have been from time to time enunciated.

We are confronted in our science, as is true in all sciences during certain periods of their evolution, with expressions of incredulity, hostility and doubt by men who, although they have great ability in some directions, have not acquainted themselves sufficiently with the practical application to understand the laws and methods adequately enough to make their criticism of much value. During the past decade I have heard much that would lead me to believe that there are far too many ready and incompetent critics. But in order to attain a healthy development every science must be strengthened by constructive criticism, and it is true that those who are chiefly interested in teaching the newer methods of orthodontic practice desire such criticism because it is our purpose to leave in the hands of our profession something of vital worth—something that has the innate capacity for further development to the end that not only shall our field be broadened, but the children who come under our care shall experience less of the result of crudity and more of sound judgment and scientific practice.

The title which I have given this short writing no doubt sounds strange in connection with a scientific meeting, but I think you will all agree with me that it is true that all scientific ideas are not always couched in terms of strict science. It is for this very reason that I have chosen this title. I have seen men utterly fail to comprehend splendid ideas which have been presented in such terms as to lose the essential phases of their meaning. Throughout my period of endeavor in behalf of rational orthodontics I have tried to lay the various theories and practices before the profession in a manner which I

\*Section of symposium on muscle function read at the Twenty-eighth Annual Meeting of the American Society of Orthodontists, July 15-20, 1929, Estes Park, Colo.

hoped would tend toward modifying the appliance complex, supplying instead the broader one of *development through function*. Hitherto, I have avoided, although repeatedly requested to give them, much in the matter of specific exercises, believing that the interested student would gain much more if he were led to appreciate the fundamental principles underlying the practice, because then a thorough understanding would result naturally in a more effective and widely diversified system of practical efforts carrying with it something of the characteristics of the operator himself, at the same time engendering within him a sense of a personal contribution to the practical side of this important treatment. Of course, under either method it is natural to expect mistaken efforts and misunderstandings to arise. In the beginning when these mistaken efforts were brought to my attention I became fearful, temporarily, of keeping the subject before the profession; but always on such occasions the successful efforts of some colleague would come as a strengthener of my faith in the inherent good judgment and practical sense of the profession.

Speaking in a scientific sense a helpful point of view is one which enables the observer to see his subject from an angle which enables him first of all to comprehend and appreciate its value to humanity. First, then, before he focuses his view upon the central point, he needs to see in it the possibility of change, and that change must be in the direction of progress and not retrogression. As I write this paragraph there stretches before me a view of one of the most magnificent bodies of water within the city limits of any of our American cities. This view has not always been a magnificent one. There was a time, not many years ago, when instead of a beautiful sheet of water spanned in many places by graceful bridges and bordered by beautiful parks and boulevards, there existed broad and ill-smelling mud-flats exposed to view during many hours of the day. When the change from ugliness to beauty, from uselessness to utility, was first contemplated, there were to be found those in hostile opposition to any change. Their point of view was what might be called static—their vision of the present held no imagination of a changing future; and so it is in professional life. There are those who are contented and who may be found willing to fight for the status quo in opposition to those whose viewpoints carry with them the imaginings of a better and more useful development.

It is, therefore, essential for us in selecting a helpful point of view in relation to rational orthodontics to ask ourselves first of all how we should look at our professional activities in order to enhance their value to humanity? Shall we continue to invent and apply to the mouths of children curious and ingenious metal contraptions for the purpose of forcing development along certain arbitrary directions which we have been taught to believe are the only satisfactory ones upon which a given human organism can develop? Or are we to ask ourselves if there is not to be found within the organism itself certain inherent tendencies which may be encouraged by natural methods to quicken in action and automatically bring about a tendency toward a more normal and satisfactory development? Having answered these two

questions, the first in the negative and the second in the positive, is it not then possible to develop further the natural method of treatment and to make life a little easier for thousands of children who must in the future undergo some form of orthodontic treatment? Then again in holding to a helpful viewpoint, would it not be profitable for us to think of ways and means of developing a correlation between a simplified form of mechanical apparatus and a further elaborated system of functional development?\*

If we approach the matter in this thoughtful attitude, we are approaching it in much the same way that the creators of that beautiful sheet of water approached their problem, and in the end we shall create greater beauty and greater utility within the fabric of our profession.

In order to lead you still further toward a helpful viewpoint toward rational orthodontics I am going to close this short effort with a quotation I have often used, what Sir Arthur Keith has to say about the viewpoint held by the great Hunter, the founder of modern orthopedic surgery:

"He was persuaded that the power to heal was a property of living tissue, but the power to recover function—the function of joints and muscles—was a property of the patient's will and brain. His opinion was that it is the surgeon's business to direct, encourage, and interest that will and brain. Without the patient's active assistance the surgeon's best efforts are in vain. Our modern experience has shown that Hunter was right. Surgeons who have accepted the principles which he taught and have sought to restore lost or lessened movements by giving the man congenial tasks that lead to voluntary exercise of weakened muscles have succeeded best. If we had followed Hunter we should never have made the mistake of supposing that elaborate batteries of gymnastic machines could take the place of the thinking brain of the surgeon and the willing response of the disabled soldier."

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BY DR. W. R. DINHAM, SEATTLE, WASH.

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**I**N SHOWING some of these cases, I want you to understand that I have not been interested in this particular phase of orthodontia long enough to show them as absolutely finished cases. Dr. Rogers, who has spent many years in this same work, can show cases similar to what I will show today, in a finished state; by that I mean several years after all appliances have been removed.

I know that it is not very effective to show something which cannot be called a finished case, but I am hoping that these patients will continue to cooperate with me by carrying on with the exercises. I believe that if they

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\*"Co-ordinating Natural and Artificial Methods of Treatments," *INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY*, 1924.



will do this I can obtain a permanency of these cases the same as Dr. Rogers has done many times in the past.

CASE 1.—Patient was a man, thirty-five years old; no treatment was instituted. This case, as shown in Figs. 1, 2, and 3, illustrates a facial deformity which was the result of the misdirection of the forces of functional activity due to the interference of malposed teeth. If this change in the contour of the mandible occurred when muscular activity was abnormally applied, it seems logical to expect normal development when conditions are favorable; namely, when the teeth are in such a position as to allow bone growth to proceed normally, stimulated by the development of those muscles associated with the jaws.

CASE 2.—Patient was a boy ten years old. Ligamentous ankylosis of the temporomandibular articulation developed as the result of an illness at the age of three years. The inactivity of the muscles of mastication resulted in a retarded development of the mandible. Appliances were placed for lateral development and the bodily movement of the mandibular anteriors. Intermaxillary rubbers were used to correct the posterior occlusion. No developmental exercises were prescribed, and the activity of all the muscles associated with the development of the mandible was greatly impaired by the very limited movement in the temporomandibular articulation.

This case seems to prove the important part muscular activity must play in bone growth; for, although the teeth were moved into their anatomically correct antero-posterior relationship and bone growth was obtained in the alveolar process through mechanical stimulation, there was but very little change, if any, in the body of the mandible. Figs. 4 and 5 shows the case before treatment; Figs. 6 and 7 show the case after the teeth were in anatomically correct antero-posterior relation.

CASE 3.—Patient was a thirteen-year-old girl. Bilateral distocclusion. Treatment: super incisors were banded with McCoy open tubes on labial and lingual surfaces to engage labial arch and lingual bite plane constructed with an incline plane. Mershon lingual appliance with hooks on molar bands for intermaxillary rubbers was placed on the lower arch. Elastics were worn triangularly from distal of upper buccal tubes to hooks on upper labial arch and hooks on lower molar bands to gain vertical development in molar region. When desired arch form and a position of mechanical advantage was obtained, developmental exercises were prescribed. The use of the intermaxillary elastics was discontinued after two months and all appliances were removed, except on the lower lingual arch, after six months. Lower lingual arch appliance was removed four months later. Exercises were continued. The case had been under observation for the past seven months with no apparent indication of relapse. Figs. 8 and 9 show case before treatment; Figs. 10, 11, and 12 show case after treatment.

CASE 4.—Patient was a girl ten years old. Bilateral distocclusion. Appliance used was same as described in Case 3, with intermaxillary rubbers worn in similar manner. When the teeth were in a position of mechanical advantage developmental exercises were prescribed. All maxillary appliances were removed after three months and the Hawley bite plane was substituted. I shall continue with this until the premolars erupt sufficiently to establish occlusion. Figs. 13, 14 and 15 show case before treatment; Figs. 16, 17 and 18 show case after treatment.

CASE 5.—Patient was a girl thirteen years old. Bilateral distocclusion. Labial arch was used on maxillary teeth in conjunction with the Mershon lingual arch to accomplish slight rotation of maxillary central incisors and obtain desired arch form, Mershon lingual appliance was placed on the mandibular arch with hooks on the molar bands. After the teeth were moved to a position of mechanical advantage developmental exercises were prescribed. The Hawley bite plane was placed on the maxillary arch. Figs. 19, 20 and 21 show case before treatment; Figs. 22 and 23 show the case after treatment.

CASE 6.—Patient was a girl twelve years old. Bilateral distocclusion with missing superior laterals. Treatment: the same as in Case 1, except bite plane was attached to maxillary



Fig. 1.

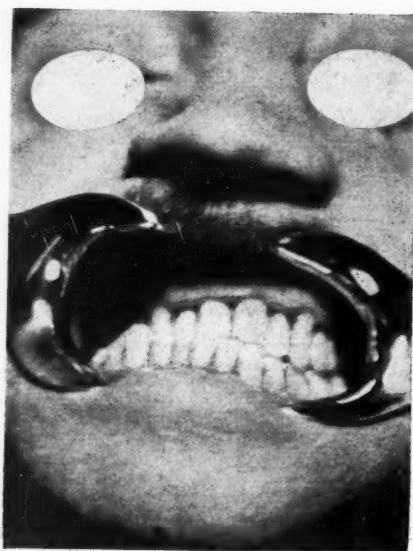


Fig. 2.



Fig. 3.

Case 1.



Fig. 4.



Fig. 5.

Case 2 before treatment.



Fig. 6.



Fig. 7.

Case 2 after treatment.

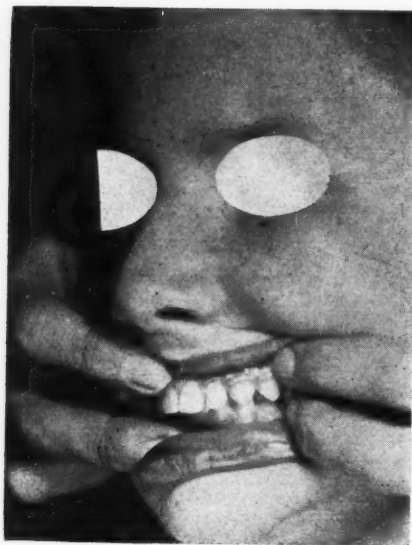


Fig. 8.

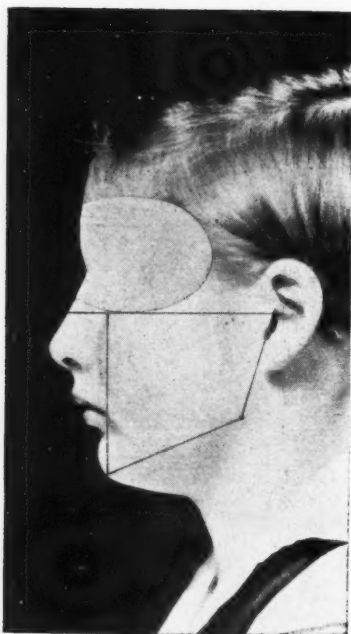


Fig. 9.

Case 3 before treatment.



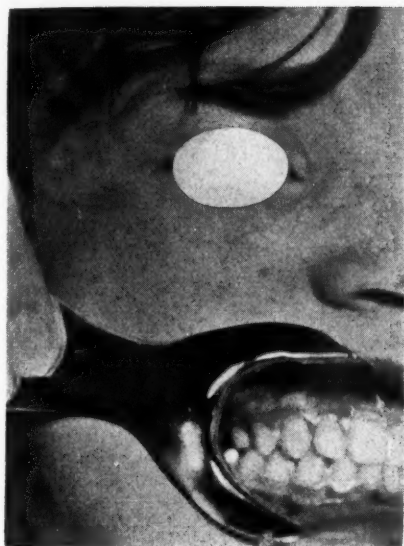


Fig. 10.

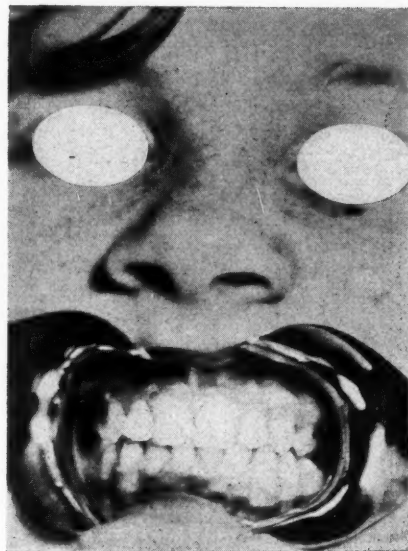


Fig. 11.

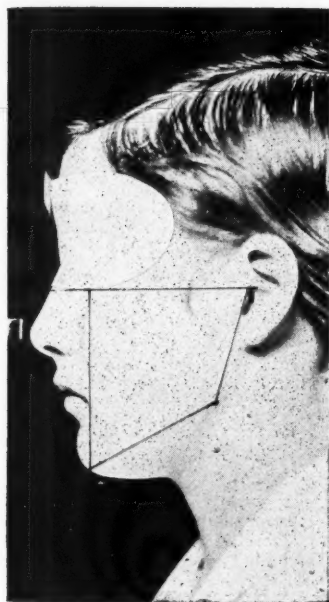


Fig. 12.

Case 3 after treatment.



Fig. 13.

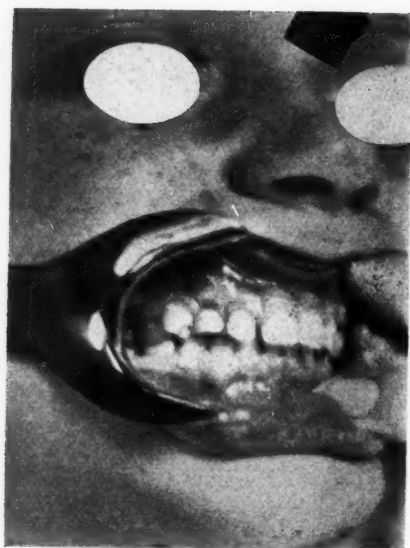


Fig. 14.

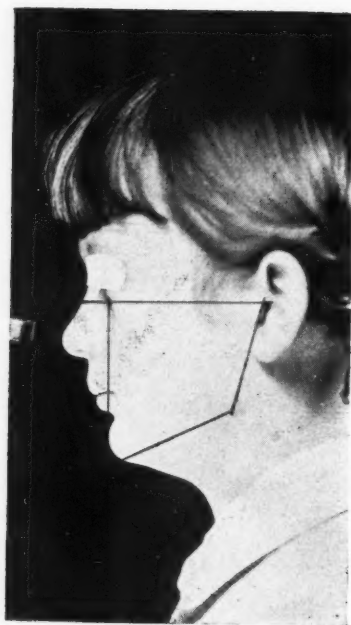


Fig. 15.

Case 4 before treatment.

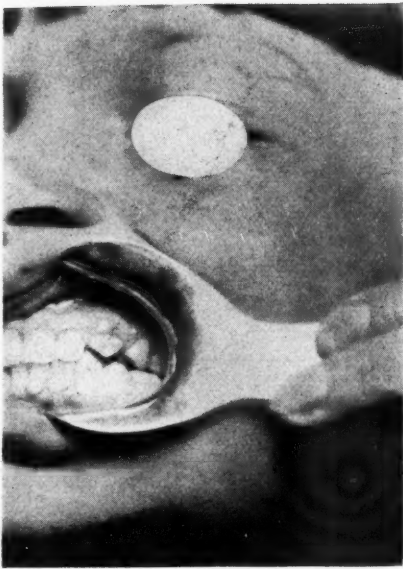


Fig. 16.

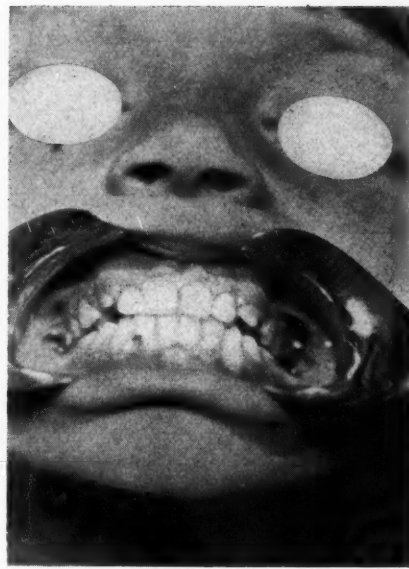


Fig. 17.

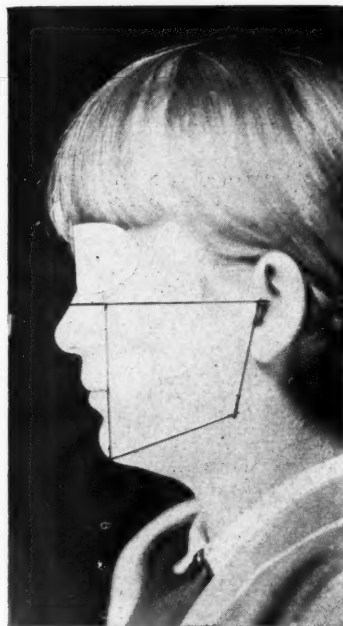


Fig. 18.

Case 4 after treatment.

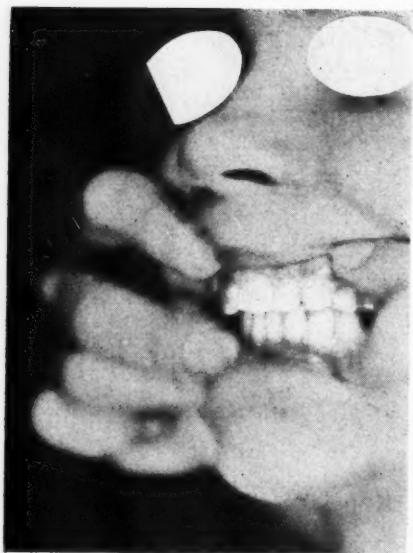


Fig. 19.



Fig. 20.

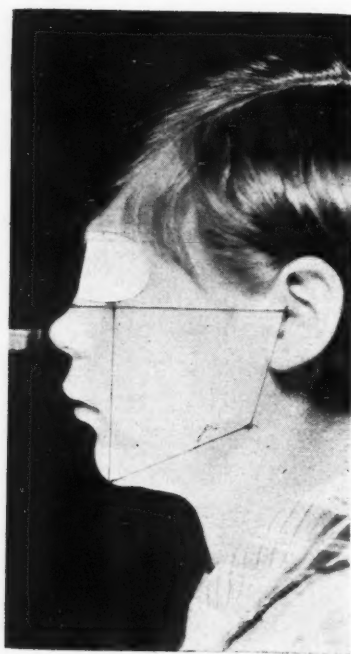


Fig. 21.

Case 5 before treatment.





Fig. 22.

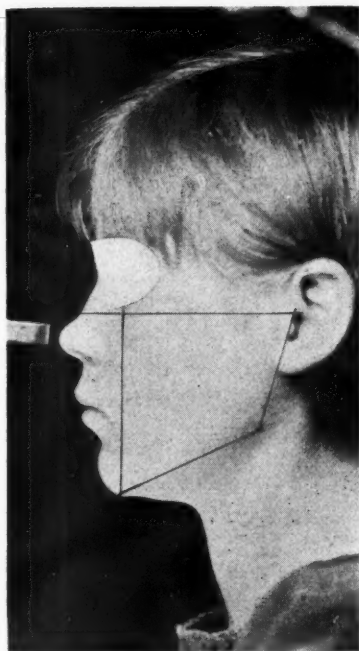


Fig. 23.

Case 5 after treatment.



Fig. 24.

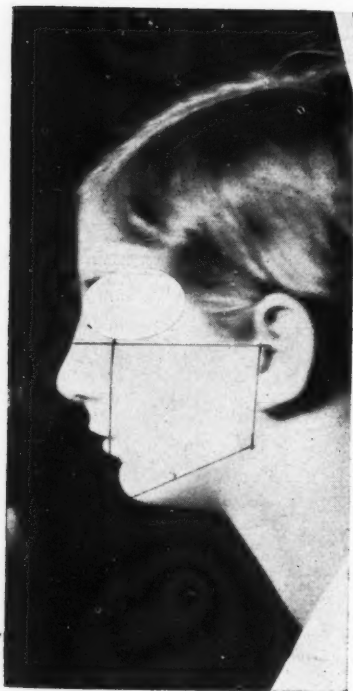


Fig. 25.

Case 6 before treatment.

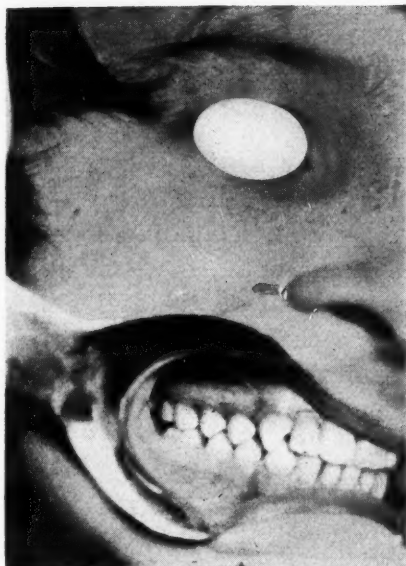


Fig. 26.

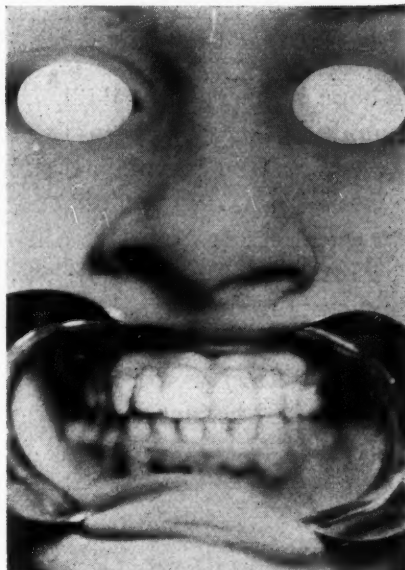


Fig. 27.

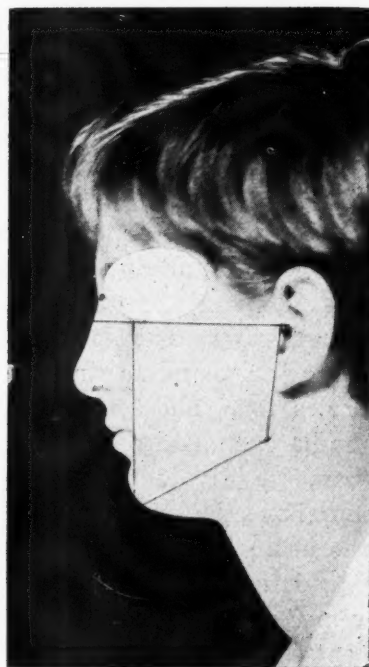


Fig. 28.

Case 6 after treatment.

canines and central incisors. Frenum operation was necessary, after which the central incisors were moved into proximal contact. The desired arch form was obtained. After the teeth were placed in a position of mechanical advantage, exercises were prescribed. Hawley bite plane with lateral incisors attached was substituted for the upper appliance. Figs. 24 and 25 show case before treatment; Figs. 26, 27 and 28 show case after treatment.

I hope at some later date, possibly in a year or so, to show these same cases again if there has been any change.

Just a word of explanation before I show the motion pictures. These were made primarily to illustrate the paper I read before the Washington State Dental Association. I did not show these particular pictures for the purpose of teaching the exercises, but because I wanted the general practitioner to realize that orthodontia is not mechanical to the full extent. I thought that if I could show them some of the habits we have to contend with perhaps they would see our side of the problem a little better. Therefore, these pictures include a few of the habits with which you are all familiar.

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BY DR. H. L. LOGAN, MOUNT CARMEL, PA.

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AT THE last moment and with the approval of Drs. Rogers and Robison, I have scrapped my paper and will contribute to this symposium by describing "First Instructions to Patient and Parent in Muscle Culture."

SCENE: My office  
CHARACTERS: Chester Lawson (patient)  
Mrs. Lawson (mother)  
Viola (my assistant)

"There are certain muscle exercises of the lips and cheeks that Chester will have to do if we ever hope to maintain the teeth in their new positions. Now look at Fig. 1, Mrs. Lawson.

"Note in this diagram the arrows. They point to muscle fibers that belong strictly to the lips (that is, they arise and are inserted in the lips themselves). But the lips have other muscles, too. These are called correlated muscles, and as the sketch shows, they radiate in all directions like the spokes of a wheel. For purposes of description, we divide these radiating muscles into two groups. Those in the group above the lips are of different lengths: some are short, extending only to the nose; others are longer and branch out into the cheeks; indeed, one pair extends up the side of the nose away up to the orbit. Now as we contract this upper group of muscles, the lip travels upward and performs its many movements. Now look beneath the lower lip. The heavy lines represent muscles that are short and stockier and more uniform in length. They move the lower lip and chin. So we must remember that the lips are made to function largely by muscles which come from distant parts of the face the fibers of which interlace into the lips themselves.

"Fig. 2 shows us another group of muscles. These arise from the point of the chin and travel backward and downward to be attached to the throat



and upper chest. They are called depressor muscles, and by their contraction the mouth is opened. They are long, thin, and ribbon-like in structure and are the ones we see on the necks of athletes when they are under strenuous exercise, and we speak of them as the 'cords' of the neck.

"The last set we are concerned with in Chester's case is made up of the muscles of mastication. They are those that close the mouth and contract when we are eating. They are a most powerful group and arise from the region of the temple above the ear. They extend downward to be attached to the angle of the mandible. Now with these sketches before us, let us see how they apply to Chester's profile, as shown in Fig. 4.



Fig. 1.



Fig. 2.



Fig. 3.

"You will notice a pronounced, sunken lip. The lower teeth strike directly in front of the upper ones and have retarded their growth, just like the feet of Chinese children are dwarfed when tightly bound in infancy. Now just as soon, Mrs. Lawson, as we move these upper teeth forward so that there is no interference by the lower teeth, then we shall begin our exercise."

*(Sixty Days Later)*

"Now Chester, your upper teeth are forward just so their cusps are free from the locking influence of the lower incisors. Now, try your exercise for the upper lip. Drive the air hard up under your upper lip. Fig. 5 shows you doing it, but incorrectly. You are blowing into your cheeks as well. Keep

the air out of the sides of your mouth and try to drive it directly under your nose. Center all the air directly under your upper lip. Try to reach that long muscle that extends up the side of your nose. Don't be discouraged, Chester, it is rather hard to do it correctly. All patients make this same mistake at first of filling their mouth instead of concentrating under the lip.

"Fig. 6 shows you doing it correctly. When you produce dimples in the corner of your mouth, it indicates the air is going up just where we want it



Fig. 4.

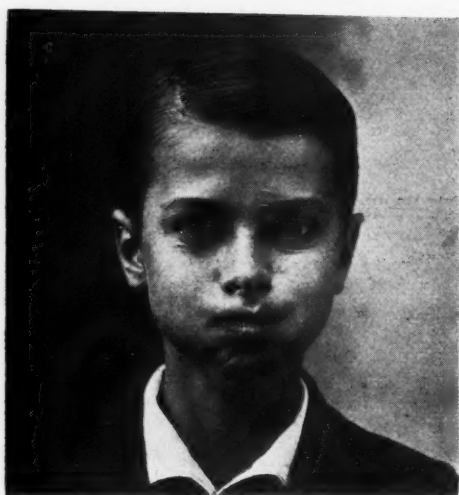


Fig. 5.



Fig. 6.

and not in the cheeks. Now do this exercise rhythmically up and down like the ticking of a clock. First force air, hold a few seconds; now again release air, and repeat this 25 times before each meal.

#### FUNCTION OF DEPRESSOR MUSCLES

"Throw your head back as in Fig. 7 and contract the ribbon muscles of your throat. This picture shows that you exercise incorrectly. Do not move your shoulders, for in doing that you take the full force of the exercise from

the throat muscles and share it with your shoulders. Now, keep your shoulders quiet and try to produce these 'cords' in your throat, the cords that you see in the throat of the athlete. These muscles, as you will see by referring to Fig. 4, have been stretched forward, and this exercise is to return them to normal tone.

"Here (Fig. 8) you are doing the exercise correctly. The head is thrown back, the shoulders stationary, and you are contracting these lower ribbon mus-



Fig. 7.



Fig. 8.



Fig. 9.

cles just exactly as you see on the neck of a sprinter at the end of a race. Now you do this just as rhythmically as you did the first exercise, 25 times before each meal. First put your head back and contract, make the cords, hold a few seconds, then release; now again, contract, cords, release, regularly like the ticking of a clock."

Compare Figs. 4 and 9. One year after treatment.

"Now Mrs. Lawson, the last exercise is quite easy and consists of stimulating the muscles of mastication, this powerful group which we spoke of, illus-

trated in Fig. 3. All Chester does is to close the back teeth together and *drive them deeper into their sockets*. Now try it, Chester. Bite, release; bite, release. This too, you will do 25 times before each meal. You will gradually increase the number of exercises, for in a few weeks it will not be fatiguing as it is now."

And now, gentlemen, I have endeavored to transpose with probably very poor results, extemporaneous motion picture into a printed case report. The mechanical appliance that I used above was a round labial wire inserted into tubes on molar bands to which the anterior teeth were ligated. Below, I placed a ribbon arch for the purpose of stabilizing intermaxillary rubbers. The rubbers were worn for a period of ninety days; the exercises were performed for one year, and since we used tooth tilting appliances entirely, we attribute the development in the maxilla to exercises alone. We directed Chester to do these exercises before meals because most of the family were present, and the task was less likely to be forgotten. My assistant has charge of this treatment. She trains children and sees that the exercises are being performed. Every three months this report card

R	Prophylaxis	Progress	Slow
R	Keeping Appointments	Muscle Exercises	R
R	Wearing Intermaxillary	General Conditions	
R—Satisfactory. X—Unsatisfactory.			

(Courtesy H. K. Cooper)

is sent to the parents, informing them what progress we are making and whether the patient is carrying out our instructions. I find it necessary in applying muscle culture in my practice to have this work looked after by a trained assistant or technician. While I am exceedingly fond of children, (like other orthodontists) I do not seem to have the infinite patience that is required in teaching them; so if I have had success in any measure, it must certainly be attributed to a capable woman assistant.

And now in conclusion, I make haste to correct any impression you might have that the average child follows our instructions religiously. He does not. The percentage is painfully small, probably 20 per cent would be a fair average. But if you can get hearty cooperation and intelligent application of this simple physiologic muscle function, you will obtain results just as startling and permanent as do Drs. Rogers and Robison.

DISCUSSION OF SYMPOSIUM ON MUSCLE FUNCTION BY DR. ROBISON, DR. ROGERS,  
DR. DINHAM, AND DR. LOGAN

*Dr. W. R. Dinham.*—To be invited to open the discussion of this important phase of orthodontic treatment, which has been presented by such recognized authorities as Dr. Rogers and Dr. Robison, is a great privilege but it also carries a responsibility, which I feel.

The short time allotted to me makes it impossible to do these splendid papers justice. I know, however, that when they are published and are carefully studied, we shall then realize their full significance. I shall limit my remarks, therefore, to those problems that have to do with the practical application of, as Dr. Rogers so appropriately termed it, "development through function."

Many of us who have had the opportunity of hearing Dr. Rogers and Dr. Robison before and have seen the results obtained by them have gone back to our practice with a



determination to try out their theories but after a trial have thought, "Well no doubt it can be done in Hutchinson, Kansas, and in Boston, but not in my practice."

What is the reason for this?

I believe, as Dr. Robison has said, "that the orthodontist has not sold himself on its importance." This of course he cannot do until the results of his efforts are demonstrated, and they cannot be demonstrated until the underlying principle of development through function is grasped.

It was at the meeting of our society at St. Louis in 1919 that I first heard Dr. Rogers, and I have had that privilege several times since. Only last year he traveled across the continent to appear on the program of the Pacific Coast Society of Orthodontists, where in the course of the three-day meeting several hours were devoted to fundamental principles underlying his practice, while a very short time was spent on the specific exercises he used. This was characteristic of his previous papers. One might go so far as to think that he had some special or secret tricks that for some reason he did not care to expose.

Today Dr. Rogers gave his reasons for doing this, and I think them so highly important that I shall again call them to your attention. He stated, "I have avoided, although repeatedly requested to give them, much in the matter of specific exercises, believing that the interested student would gain much more if he were led to appreciate the fundamental principles underlying the practice. Because then a thorough understanding would result naturally in a more effective and widely diversified system of practical efforts carrying with it something of the characteristics of the operator himself, at the same time engendering within him a sense of a personal contribution to the practical side of this important treatment."

Dr. Robison brought up the problem of cooperation, which of course is all important and, as he stated, at times most exasperating to the operator. Here, however, we must consider that we ourselves do not always fully appreciate the importance of that which we are suggesting, and if we do not, how can we impress our patients or expect them to react favorably?

Children are all different; some will cooperate willingly while others seem to resist all efforts on our part, although I believe as our understanding increases, as it must with earnest sincere application, our endeavors will be rewarded with a larger percentage of successes and with the satisfaction of ridding our patients many times of useless as well as an unnecessary amount of appliances.

Dr. Rogers made a suggestion in the past which I think most timely to recall, and that is, "Try to stimulate the desire within the child to help itself." This can be done by appealing to his vanity and showing similar cases that have been improved. Many other ways may be used by the tactful operator.

Another thing I feel should be mentioned is what Dr. Rogers terms "mechanical advantage," or that position in which the dental arches are so placed that the cusp relationship or the incline plane relationship is such that the forces of functional activity will tend toward normal development. In this regard the mounting of models on an articulator that will reproduce the movements of the temporomandibular articulation may prove helpful or the use of articulating paper to determine more readily cusp interference. I believe a little grinding of cusp interference is permissible in certain cases.

*Dr. Martin Dewey, New York City.*—There is no question about the value of muscular function, but I believe there is some question about exercising muscles so as to produce abnormal motions and functioning.

I belong to that group which Dr. Rogers mentioned who failed to understand the function of the pterygoid muscle correcting posterior occlusion. We contend that in those posterior occlusions the condyle occupies the position of the glenoid fossa. We have never found an x-ray to show that was incorrect. We have looked through all the works on anatomy trying to find anyone who ever said a bone was held in position by muscular action. I fail to see what value the external pterygoid muscle is going to have. It simply slides the mandible forward. If it is exercised, you are going to change the temporomandibular articulation. The muscles never hold the mandible in position, or any other bone in position. They are held in position by ligaments.

Dr. Robison showed skulls from Dr. Wingate Todd's collection to illustrate the shape of the condyle and glenoid fossa by extensive and continued pressure on the external pterygoid. X-ray pictures showed the same thing. We have checked up on some of these patients. We find, as Dr. Rogers did, that they bite forward. In the masticating position they drop back. Some men are going to say they have treated cases through the external pterygoid muscle and have successful results. They have had that successful result not because of the pterygoid action but in spite of it.

The temporal and master pterygoid muscles are attached to the ramus. We find in examination of skulls with posterior occlusions that the ramus is well developed. The deficiency is in the body of the mandible.

Therefore, to my mind, the muscle exercises that are valuable are the hyoid groups, the facial muscles, or all of those except the muscles of mastication. I believe the muscles of mastication always have enough exercise to develop the ramus of the mandible whether the teeth are in normal occlusion or malocclusion. The patient must masticate a little bit. He must move his muscles some.

Therefore, I am still unconvinced, in spite of the fact that I am placed in that group which does not understand these things, that external pterygoids and the master temporal muscles can be dispensed with if you do the exercises of the hyoid group and the facial muscles of expression, the muscles associated with respiration, deglutition and speech. Those are the ones that are going to do the work. Exercise of the external pterygoid and temporal is apt to do harm. The master temporal, I think, is of no advantage.

You must remember that all of these patients who have abnormal muscular function are also abnormal breathers. Therefore, you must improve the breathing. Breathing exercises must be included.

I am very sorry to hear Dr. Rogers make the statement, which may be correct, however, that a case of posterior occlusion was corrected by muscular exercise alone.

Just the other day a patient was brought to my office of whom some orthodontist said, "You do not need to correct this case. No appliance is needed; simply muscular exercise." The arch was extremely narrow. There was mechanical interference. The patient could not possibly occlude those teeth where they belonged anteroposteriorly. Still, some enthusiastic muscle advocates, who I think are intended to interpret Dr. Rogers' meaning, have advised orthodontic treatment. I do not see how you are going to get the proper muscular exercise, the proper muscular function, until you remove the mechanical disadvantage.

You notice in Dinham's treatments he used almost everything used in the orthodontic armamentarium. With Mershon's appliances, he used the pterygoid exercises, master temporal exercises and exercises of the lips and the hyoid group, the facial muscles; a beautiful shotgun prescription. Some of them are good. Some of them are no good.

If you are going to use bite planes, why use the maxillary rubbers also? This has to be brought down to a more careful point of apical size.

Until some one shows me I am wrong by an anatomic demonstration, I shall believe the external pterygoid muscle exercise is no good in developing the body of the mandible and is liable to do more harm than good.

*Dr. G. W. Grieve, Toronto, Ontario.*—The subject is most interesting, but I do not want to take up valuable time in its discussion. I admire very much the work of Dr. Rogers and believe it fills a very important field.

I am of the opinion that the majority of cases which we are called upon to treat are the result of inequality of muscular pressure or other abnormal functions.

I also believe that none of us with our appliances can successfully correct many of these cases unless we are fully cognizant of the part that the muscles play. I feel we should not go to extremes, and we are all inclined more or less to do so when we have some particular viewpoint. I agree with Dr. Dewey that it is next to impossible to correct most of these distocclusion cases without the use of appliances.

I noticed in Dr. Dinham's presentation the use of intermaxillary elastics with a lingual arch upon the mandibular teeth. I believe that is wrong because such anchorage is inadequate.

In regard to the lengthening of the mandible, some of you may remember that some years ago I presented something along that line—the use of buccal planes. While I do not know what change (if any) takes place in the condyles, or in the glenoid fossae, I feel that in cases treated by this method the mandible is lengthened; for the patient cannot, after the planes are removed, place the mandibular teeth in distal occlusion. In cases where these planes have been off for several years, there is no tendency of the mandible to drop back, as it seems to have been actually lengthened from the condyles to the symphysis.

I believe the use of intermaxillary elastics in the treatment of distocclusion cases is absolutely wrong, regardless of any anchorage we can use, because some of the mandibular teeth in many of these cases are too far forward in relation to the apical base before we begin; consequently, we cannot take the chance of elastics pulling them forward still farther. We must resort to occipital anchorage.

*Dr. Homer B. Robison.*—There has been a great deal of very valuable discussion or should I say contribution, and I appreciate the manner in which all those who have taken part in it have dealt with the subject. I am really sorry I have not more time to deal with all the points that were brought out, as there were so many good suggestions made.

Dr. Rogers mentioned that I used the term muscle exercise. If I did, I stand corrected because I think it is not a proper term; however, in my subject I used the term muscle function.

He also spoke of too many critics; I believe there is a good note of warning in that statement. We want to be criticized, but let it be constructive, and before you criticize try it out. Do not blame the method, and if it is honestly employed, you will probably find that the fault lies with yourself, but make an effort to determine where the real trouble is.

His reference to forcing teeth in an arbitrary direction was a very good point. I think that is where the whole secret lies. A lot of orthodontists see nothing except the crowns of the teeth and are disregarding the developing of bone in the apical region and are not recognizing the importance of developing the surrounding tissue or organs that must be functioned in conjunction with tooth movement, and this is sadly neglected.

His reference to the orbicularis oris being closely related to the nervous system has given us food for thought. Dr. Dinham's reference that some may think that this cannot be done in your home town is another very good suggestion. Another thing he mentioned was the diversified opinions. That is what we want, of course. You can see by this discussion that different men are using somewhat different methods and obtaining results, all focusing more or less on the one point, attaining functional relation. And if you have some method that is more efficient in your hands than those we have shown you here, employ it.

I was very much interested in Dr. Dinham's and Dr. Lewis' presentation of open-bite, their stressing the tongue as a factor. That is a very important point, for if you stop to think that the individual with an open-bite must use the tongue as an obturator as, for instance, in saying "through." I will open my mouth and try to say through. "Hoo." That is the very best I can do unless I place the tongue some way to help frame the mouth to pronounce that word correctly, which will hold the teeth apart.

I was very much pleased with Dr. Logan's presentation. I saw part of it in New York, but the machine did not work very well. The thing I should like to emphasize particularly was the way that individual was able to raise the nose after a year, but I did not like the term "completed." The case is not finished by any means. Unquestionably, however, it is at the point where it will finish itself, but do not think cases are finished at that stage; they should be kept under observation.

In regard to Dr. Dewey's experience with the function of the external pterygoid, I also feel that it is a rather dangerous exercise, as I mentioned in the paper. However, I believe Dr. Rogers has been misinterpreted by overenthusiastic individuals, and I am quite sure that Dr. Rogers will agree that we must not become too enthusiastic and overdo a certain type of exercise.

I appreciate the sentiment expressed by Dr. Grieves that we should be careful, in attempting these exercises, that we know what we are doing.

*Dr. A. P. Rogers.*—I have very little to say in closing. I regret Dr. Dewey's criticism—which criticism I do not consider constructive. It is to my mind rather what you might call destructive criticism and has very little, if any, merit.

I do not believe Dr. Dewey has had a great deal of experience in this particular method of orthodontic treatment, or I am sure he would not make statements of such a nature. Dr. Dewey's ideas may be based on theories that seem to be sound, but after fifteen or twenty years' experience in this form of treatment, I believe them not to be sound.

I am very sorry I have to speak this way, and I do so only in order to prevent clogging the wheels of progress. Dr. Dewey will understand that what I say is said in a friendly spirit; but having in mind many successes I believe Dr. Dewey would do well to carry out a few experiments and prove to himself that the use of the external pterygoid muscle within its functional limits is good practice in many cases, and that the use of the masseter-temporal group is one of the very first and most important exercises in the correction of malocclusion and in its retention.



## THE CALCIUM TO PHOSPHORUS RATIO AS RELATED TO MINERAL METABOLISM

BY JOSEPH Z. SCHNEIDER, Sc.D., PRAGUE INSTITUTE OF TECHNOLOGY,  
PRAHA, CZECHOSLOVAKIA

IN THE last few years a great deal of attention has been given to the mineral character of the diet; and dietitians, physicians, dentists, and social workers have laid great stress on a well-balanced, mineral diet as an aid in preventing and in the treatment of certain dietary deficiency diseases.

Most of the mineral components of the diet and of the human body have received some share of the general interest taken in mineral nutrition and metabolism.<sup>1</sup> Calcium and phosphorus, being by far the most important components of the body's minerals in quantity, have been studied the most and have received the most publicity.

It is known that when considering the calcium and phosphorus character of the diet and their rôle in the mineral metabolism of a normal human organism, four main points must be considered: (1) the absolute amount of both these elements in the diet, (2) the relative ratio of these elements, (3) the vitamin D characteristic of the diet, and (4) the sunlight or ultraviolet irradiation available to the person in question. These four points present the directions in which the mineral balance of the diet should be maintained or adjusted, but they are subject to different scientific as well as commercial interests and exploitation.

One not specially familiar with the recent advances in this field might expect that any steps undertaken to achieve an adequate mineral balance in the diet or for maintaining a mineral balance in the body, would be based primarily on the quantitative intake of calcium and phosphorus in the diet; but the most modern views show this is not so.

The surprising discovery of vitamin D and of its rôle in mineral metabolism, together with the lack of a perfect understanding of it for many years after its detection, resulted in the focusing of the scientific interest on this particular phase of mineral nutrition. This has then resulted in overlooking, or neglecting, another viewpoint which is at least as logical, if not more so, as the placing of the whole of the burden for calcium and phosphorus metabolism on the functioning of vitamin D.

Attention to the possible overestimation of the value of vitamin D has very recently been commented on.<sup>2</sup> We see in the last few months that the recommendations for the dietetic treatment and the prevention of mineral malnutrition, while still overemphasizing vitamin D, include along with the administration of it the consumption of calcium and phosphorus in proper quantities and ratio.

TABLE I\*

Ca:P = 1:X		Ca PER CENT	P PER CENT
x =	0.115	0.122	0.014
	0.121	0.107	0.013
	0.141	0.347	0.049
	0.267	0.071	0.019
	0.273	0.011	0.003
	0.273	0.121	0.033
	0.365	0.104	0.038
	0.400	0.020	0.008
	0.417	0.024	0.010
	0.434	0.106	0.046
	0.441	0.034	0.014
	0.466	0.045	0.021
	0.474	0.078	0.037
	0.496	0.123	0.061
	0.552	0.029	0.016
	0.594	0.207	0.123
	0.644	0.045	0.029
	0.651	0.083	0.054
	0.655	0.055	0.036
	0.683	0.041	0.028
	0.705	0.044	0.031
	0.716	0.162	0.116
	0.719	0.064	0.046
	0.722	0.018	0.013
	0.734	0.931	0.683
	0.775	0.120	0.093
	0.779	0.086	0.067
	0.821	0.056	0.046
	0.846	0.065	0.055
	0.882	0.017	0.015
	0.886	0.035	0.031
	0.922	0.077	0.071
	0.924	0.105	0.097
	0.952	0.021	0.020
	0.977	0.043	0.042
	0.984	0.124	0.122
	1.00	0.011	0.011
	1.01	0.067	0.068
	1.05	0.210	0.220
	1.06	0.049	0.052
	1.13	0.015	0.017
	1.28	0.137	0.176
	1.29	0.059	0.076
	1.32	0.034	0.045
	1.34	0.029	0.039
	1.38	0.021	0.029
	1.50	0.016	0.024
	1.52	0.025	0.038
	1.55	0.018	0.028
	1.56	0.025	0.039
	1.60	0.020	0.032
	1.63	0.019	0.031
	1.71	0.007	0.012
	1.73	0.015	0.026
	1.78	0.014	0.025
	1.94	0.054	0.105
	1.94	0.239	0.465
	2.00	0.017	0.034
	2.06	0.016	0.033
	2.06	0.064	0.132
	2.36	0.011	0.026
	2.37	0.019	0.045
	2.50	0.006	0.015
	2.56	0.023	0.059
	2.68	0.067	0.180

TABLE I—CONT'D

Ca:P = 1:X		Ca PER CENT	P PER CENT
2.95	dried beans	0.160	0.471
3.00	oysters	0.052	0.155
3.08	coconut	0.024	0.074
3.44	bananas	0.009	0.031
3.44	white wheat bread	0.027	0.093
3.50	whole wheat bread	0.050	0.175
3.82	egg yolk	0.137	0.524
3.91	tapioca	0.023	0.090
4.02	walnuts	0.089	0.358
4.09	lentils	0.107	0.438
4.14	potatoes	0.014	0.058
4.33	green fresh pepper	0.006	0.026
4.44	Brussels sprouts	0.027	0.120
4.53	green peas	0.028	0.127
4.60	white wheat flour	0.020	0.092
4.64	crackers	0.022	0.102
4.76	peas	0.084	0.400
4.95	chocolate	0.092	0.455
5.62	peanuts	0.071	0.399
5.68	oatmeal	0.069	0.392
5.95	farina	0.021	0.125
6.16	rye bread	0.024	0.148
6.33	cocoa	0.112	0.709
6.35	mushrooms	0.017	0.108
6.55	macaroni	0.022	0.144
7.67	whole wheat flour	0.031	0.238
7.90	shredded wheat	0.041	0.324
9.05	barley grits	0.020	0.181
10.53	fish meat (average ratio)	0.109	1.148
10.55	cornmeal	0.018	0.190
10.67	polished rice	0.009	0.096
13.09	hominy	0.011	0.144
14.79	wheat germ	0.071	1.050
16.06	rye flour	0.018	0.289
17.16	sweet corn	0.006	0.103
18.58	meat (average ratio)	0.058	1.078
23.64	chicken meat	0.011	0.260

\*The Ca:P ratios were calculated from the analytical data found in Sherman's "Chemistry of Food and Nutrition."

I have studied the results obtained in supplementing the normal Central European diet by means of calcium and phosphorus in those ratios existing in the human body, the amount of calcium ingested daily being 1.33 gm. The results of these studies have shown that it is possible to promote in this way an adequate calcium and phosphorus metabolism without supplementary addition to the diet of any source of vitamin D.<sup>3</sup>

These observations on human metabolism are in agreement with the findings of Sherman and Pappenheimer,<sup>4</sup> who were able to cure rickets in their experimental animals merely by an adjustment of the mineral ingredients in their ricketogenic diet. These observations are in agreement with the statement of Orr<sup>5</sup> that rickets will not occur in the absence of vitamin D and in the absence of the sunlight or ultraviolet light if the diet allows all the essential minerals to pass through the wall of the intestine in the proper amounts and proportions. They are also in agreement with Orr's claim that the adjustment of the mineral balance in the diet is more important than the inclusion in the diet of substances supposed to be rich in vitamins and are in agree-

ment with the actual chemical character of those diets which are now recommended or used as the diets for promoting mineral well-being.

The calcium and phosphorus contents of the more important foodstuffs and their ratio should be given before discussing the mineral character of foodstuffs and diets and the great importance of the minerals present in them, and their dietetic value in contrast with the value of their vitamin D content. No particular attention has been paid so far to this question of the calcium to phosphorus ratio in foodstuffs and the possibility that this ratio might be an influencing factor in mineral balance.

The second point to be emphasized is the definition of the optimum ratio of calcium to phosphorus in the diet. This ratio is given by McCollum<sup>6</sup> as 0.60-0.65 to 0.35-0.40. He says that man needs a little more than half as much phosphorus by weight as he needs of calcium.

No rickets develops when Ca:P varies between 1:0.484 and 1:1.0683, but it does result when this ratio reaches 1:0.3059.<sup>7</sup> Corlette<sup>8</sup> is of the opinion that the "demand ratio" for calcium and phosphorus is broadly parallel to the ratio in which these elements are stored in the body.

Ninety-nine per cent of the calcium and phosphorus in the body is stored in the skeleton,<sup>4</sup> and thus the "demand ratio" should be the same as the Ca:P ratio in human bone. The figures for CaO in human bone vary according to Neumeister,<sup>9</sup> Loll,<sup>10</sup> McLester,<sup>11</sup> and Schrodtt<sup>12</sup> between 51.31 per cent and 52.83 per cent, and the figures for P<sub>2</sub>O<sub>5</sub> vary between 36.65 per cent and 38.9 per cent.

$$\frac{\text{CaO}}{\text{P}_2\text{O}_5} = \frac{51.31-52.83}{36.65-38.90} \rightarrow \frac{\text{Ca}}{\text{P}} = \frac{36.67-37.75}{16.01-16.99} = \frac{1}{0.444}$$

This ratio 1:0.444 is very close to the European conception of an adequate Ca:P ratio in the diet and is the same proportion as is found in mother's milk. Pooled milk of American mothers, according to the recent findings of Outhouse, Macy and Brekke<sup>13</sup> contains 30 mg. of calcium and 14 mg. of phosphorus per 100 c.c., the ratio in question being thus 30:14, i.e., 1:0.466. (Orr gives 1:0.434.)

Another view as to the optimum Ca:P ratio may be found in the results obtained by Tobiašek and Schneider who supplemented the normal Central European diet with calcium and phosphorus in the proportion 1:0.425. With an intake of 1.33 gm. of calcium daily they found that in the average of a number of experiments 31.93 per cent of the calcium ingested was retained by the system. This utilization is equalled only by the assimilation of calcium from the easiest assimilable calcium food, which is cow's milk.<sup>14</sup> It is to be specially noticed that in the above-mentioned experiments, no vitamin D has been administered, save that found in the general diet. The optimum ratio based on chemical composition of bone or milk is confirmed by the results of Daniels and Hutton,<sup>15</sup> who in their studies of metabolism on infants have shown that normal calcification takes place when calcium and phosphorus are retained in the proportion of approximately 2:1.

Park<sup>16</sup> recommends the proportions of salts in the food to be such as to preserve the normal relations of the salts in the blood. Calcium contents in



the human serum vary between 9 to 11 mg. per 100 c.c., and phosphorus contents vary from 3.2 to 4.3 mg. per 100 c.c., their ratio varying thus between 1:291-1:0.477.

Summarizing the various figures reported above, we may suppose that the optimum ratio between calcium and phosphorus in the diet amounts to 1:0.425-1:0.475.

In order to show that the proper Ca:P ratio in foodstuffs is of chief importance in judging the value of a foodstuff as a factor in mineral metabolism, let us consider first the recent work of May Mellanby, one of the leading scientists in the field of mineral metabolism. She has paid particular attention to the calcifying properties of different foods, especially as reflected in the development of the teeth, and her publications contain a large amount of experimental data. Her recent publications deal with the importance of vitamin D, both natural and artificially produced by means of the irradiation, for the adequate calcification of the teeth. While there is no doubt that vitamin D in the experiments reported was responsible for an improved calcification; the calcification might possibly have been obtained also by the adjustment of the mineral balance in the diets fed to dogs, used as experimental animals, or to children fed in other experiments. It should be emphasized that the improvement of calcification of the teeth in several cases might well have been caused by the increased administration of vitamin D as well as by the improvement of the mineral character of the diet, while all the credit for beneficial action was given exclusively to vitamin D.

As the basal diet in a certain long series of experiments, May Mellanby<sup>17</sup> used a diet composed of

80 to 200 gm. cereal,  
10 to 30 gm. lean meat,  
150 to 300 gm. separated milk,  
10 gm. fat,  
1 to 4 gm. sodium chloride,  
besides orange juice and yeast.

This diet, if not accompanied by vitamin D or vitamin D containing foodstuffs, resulted in a defective structure of the teeth.

It is necessary to consider the calcium and phosphorus character of this diet. Cereals contain in average 0.02 per cent of Ca, and the Ca:P ratio in cereals may be taken at 1:8.5 as an average. Lean meat contains approximately 0.007 per cent of Ca, and the Ca:P ratio averages about 1:18.58. Corresponding figures for separated milk represent 0.1 per cent and the ratio 1:0.775, while in the case of fat both these figures are practically nil. Therefore

80-200 gm. cereal	contain	0.016 -0.04	gm. Ca and	0.136 -0.34	gm. P;
10-30 gm. lean meat	"	0.0007-0.0021	gm. Ca and	0.0131-0.039	gm. P;
150-300 gm. sep. milk	"	0.15 -0.30	gm. Ca and	0.116 -0.2325	gm. P.
Total		0.1667-0.3421 gm. Ca and 0.2651-0.6115 gm. P.			

The ratio Ca:P equals 0.1667:0.2651 or 1:1.59 in the one extreme and 0.3421:0.6115 or 1:1.42 in the other.

The ratio 1:1.42, disregarding the ratio 1:1.59, is considerably higher than the upper limit ratio of McCollum, previously reported (1:1.0682); and there is, therefore, no wonder that such an unbalanced mineral character of the diet resulted in a mineral disturbance.

She was able to arrest this disturbance in several ways. The addition of cod liver oil to the diet resulted in excellent tooth structure. This result, obtained by the administration of large amounts of vitamin D, is to be expected. Disturbances caused by a lack of proper mineral balance in food may be checked by other means, as well as by an increase of the vitamin D intake, which vitamin Orr and others believe, is effective only in cases of disturbances in the proper balance of the mineral constituents in the food intake.

According to May Mellanby, butter and butter fat improved the calcification greatly, and it was found that butter gave better results than the butter fat. These results show clearly that vitamin D alone (butterfat) acts less well than vitamin D in connection with some minerals (butter); or one might argue that these results show that vitamin D is less important for proper calcification than the intake of minerals. At least the relative value of each in producing the desired results is certainly by no means clear. The Ca:P ratio in butter is not an ideal one, but it is fairly close to the McCollum's range, and the high content of vitamin D in butter easily corrects the somewhat ill-balanced proportion of Ca:P in this fat.

Egg yolk greatly stimulated tooth calcification. She explains it by its richness in vitamin D, and this vitamin seems to be responsible chiefly for the observed action, for the Ca:P ratio in egg yolk is 1:3.82. On the other hand there also might be expected some beneficial influence due to the abundance of both calcium and phosphorus in egg yolks.

Green vegetables improved the calcification slightly, and this fact seems to militate against the importance of an adequate Ca:P ratio in the food-stuffs, as the vegetables show a very favorable Ca:P ratio. This discrepancy is well explained by May Mellanby herself, as she remarks that dogs used in the experimental feeding do not readily digest green vegetables. A similar low utilization of minerals from vegetables is reported by Luttinger<sup>18</sup> who concludes from the results obtained by different workers that the calcium in vegetables is not utilized by children as well as that from milk, but he remarks that this obviously depends upon the kind of vegetables eaten.

A lower utilization of minerals from vegetables is not surprising if we remember that also proteins, carbohydrates and fats are utilized to a lesser degree than those of milk, etc., because of their cellular covering. It is to be expected that minerals, because of the physical character of the products of their digestion, would be utilized from vegetables rather better than the fats contained in vegetables. This view finds some backing in Hunt's statement<sup>18</sup> to the effect that minerals, compared with the other components of our vegetable diet, are more easily assimilable from green food because "they are better dispersed in it."

According to May Mellanby's experiments, whole cow's milk "in sufficient quantities in relation to the other factors in the diet" resulted in a good

calcification, and its calcifying effect was definitely higher than that of butter, despite the fact that butter is the vitamin-bearing component of milk. She explains this fact by saying that butter would act much better if associated with a large quantity of calcium, such as is present in milk. This statement may be interpreted as meaning that the proper Ca:P ratio in a prominent component of the diet is of distinctly higher importance than the vitamin D content of the diet.

My views stated at several points in this paper, are confirmed by the observation of May Mellanby, as she found that an addition of calcium phosphate, calcium acid phosphate or even calcium carbonate, to a diet containing butter, but otherwise deficient in calcium, beneficially effects the calcification of the teeth. Both these phosphates improve the Ca:P ratio of the diet directly, and the calcium carbonate also improves this ratio indirectly by increasing the calcium in the diet where the phosphorus content in its relation to calcium is too high. In this way the salts reported improve the calcification without the stress she has laid on the value of vitamin D.

Nonirradiated cereals produce badly calcified teeth and are considered to possess certain anticalcifying properties due to their content of toxamin or toxamins. While the existence of such substances is not questioned, it is quite interesting to note that the cereals which prevent the calcification show a very poor Ca:P ratio: oatmeal 1:5.68, cornmeal 1:10.55, rye flour 1:16.06, whole wheat flour 1:7.67, rice 1:10.67, white wheat flour 1:4.60 and wheat germ 1:14.79.

It is my view, which is substantiated by the results obtained by Tobiášek and Schneider, that the best diet, so far as mineral contents are concerned, is a diet which in one or several of its ingredients brings to the body more than 1 gm. of calcium daily, and at the same time phosphorus in such a quantity as to have the Ca:P ratio at its optimum. This view may be substantiated in other ways.

It is generally known that those nations which base their daily food supply almost exclusively on milk and milk products, and such nations as consume milk in amounts exceeding the American standard intake of one quart of milk a day, show a wonderfully developed skeleton and do not suffer from dental caries. Tartars living chiefly on mare's and cow's milk, Arabs living on camel's and goat's milk; various tribes of the South African negroes, and Scandinavians consuming large amounts of cow's milk daily have well-calcified teeth. This use of milk substantiates my views, as milk contains vitamin D, and the health giving properties may be by these people ascribed to the vitamin D present. It is known that milk contains less vitamin D than is necessary to correct the results of a mineral disturbance,<sup>19</sup> and it is also known that vitamin D acts least, if at all, when the salts are present in the diet in the proper ratio (Orr), and this optimum ratio is the one found in milk.

The disturbance in mineral metabolism caused by certain diets is attributed to the presence of excessive amounts of sucrose and other highly refined carbohydrates in the diet. Such carbohydrates are often considered to act directly, while as a matter of fact they act indirectly. The remarkably

good teeth of Italians are explained, for example, by the very low average consumption of sucrose in Italy; but the good teeth may be better explained by the mineral content of the average Italian diet; the mineral content of which is not diluted by an ash free sucrose. The appearance of caries in Korea after the time when sugar became a prominent part of the diet of the natives (a verbal statement of Prof. E. H. Hatten) may be explained by the same "dilution" of the minerals in the diet. Orr, in keeping with the explanation just given, explains rickets induced in infants by the use of sweetened condensed milk not by the "evil" effects of the presence of excessive amounts of carbohydrates, but by the deficiency of minerals caused by the "dilution" of the minerals in the original milk by means of the sweetening, which "dilution" does not necessarily cause any decrease in the actual calory value of this food. The bad teeth of the British, whose diet contains large amounts of cereals and sweets and small amounts of milk, butter, eggs and cheese may be explained similarly.

The fine state of mineral metabolism produced by a tough, fibrous diet, may be also explained on the basis of a mineral adequacy of the diet. It is assumed<sup>20</sup> that a fibrous diet and a diet of hard coarse foodstuffs causes the good teeth of peasants and more primitive races, because such a diet cleanses the surface of the teeth and causes plenty of exercise for the teeth and their supporting structures. This assumption is open to doubt in the light of contradictory statements found in the literature. Lennox<sup>21</sup> reports that the South African negroes have most wonderful teeth despite the fact that their diet is mainly liquid or semiliquid food. The cleanliness and fine condition of the teeth of the people eating coarse food is more adequately explained by their ingestion of an unrefined diet, consisting of vegetables, fruits and usually large amounts of milk and milk products.

Returning to the subject of the fine teeth of Italians, it must be borne in mind that they have a large daily consumption of macaroni, spaghetti and other pastes all of which show a very unfavorable Ca:P ratio. As a matter of fact, this unfavorable ratio should result in badly calcified teeth, but it must be remembered that Italians consume large quantities of oranges. The acid reaction of this fruit is sometimes considered as the reason for their fine teeth, but this fruit brings to the body substantial amounts of both calcium and phosphorus in an ideal ratio 1:0.466.

The importance of the proper Ca:P ratio in foodstuffs is confirmed finally, by the general knowledge of those foodstuffs which promote proper mineral well-being and which are recommended for the prevention or betterment of a disturbed mineral metabolism. All these foods: lemons, oranges, celery, cauliflower, cabbage, milk, limes, turnips, cheeses, cream, carrots, and other similar foodstuffs, show a Ca:P ratio very close to the optimum ratio 1:0.466 reported, the ratios in question varying between 1:0.417 to 1:0.821.

#### SUMMARY

(1) Calcium and phosphorus under certain conditions will prove adequate without the assistance of vitamin D for the requirements of the mineral metabolism of the body, so far as these two particular elements are concerned.



(2) The use of a foodstuff or of a nutrient which brings more than one gram of calcium to the human organism daily and which at the same time brings phosphorus in a quantity which corresponds to the optimum Ca:P ratio in the diet, makes the diet a properly balanced one, so far as these elements are concerned.

(3) The optimum Ca:P ratio in an adequate diet is the same as that found in human bone or in mother's milk (1:0.444, 1:0.466).

(4) Foodstuffs with a favorable Ca:P ratio are: lemons, oranges, celery, cauliflower, cabbage, milk, turnips, limes, cheeses, cream, carrots.

(5) The ills often laid at the door of sucrose and other highly refined carbohydrates are more properly explainable on the ground that they act as a dilutant of the necessary mineral content of foods. It is this reduction of the mineral intake which causes this trouble rather than any trouble which may be directly traceable to the sucrose and other carbohydrates.

(6) It is not a coarse and fibrous diet which is the cause of good teeth, but rather the high and properly balanced mineral content of such an unrefined diet.

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## THE TEACHING OF ORTHODONTIA

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TO ONE who has been out of active contact for a period of several years with the opinions regarding methods of teaching orthodontia, some of the tendencies in this matter are quite interesting and even astounding.

Having assisted in the earliest formulation of orthodontic instruction and having continued this work for at least eighteen years, I hope that my temerity to express an opinion at this time may be classed as a pardonable offense in case I fail to be convincing. My position has been given by one of my friends as "standing on the side lines of the game" and let us hope near the cheer leader. It is the endeavor in this article to speak plain facts in a homely manner.

The recommendation to extent postgraduate instruction in orthodontia over a period of one year or more is startling. In amazement may it be permissible to employ a bit of slang—*Why and how come?* Let us try to explain.

For many years there has been not only an insinuation but a cry that orthodontia is beyond the comprehensibility of graduates of dentistry. The inference being that the dental profession is recruited from a class of human beings with a very low average of mentality.

When we realize, as we must, that dentistry in a short span of years has taken an undisputed place in the great healing science and art, how can any sane being indulge in the hallucination that the masses of men who were responsible for its founding and those who have so ably perpetuated it were mental weaklings?

Perfection and infallibility have not been attained and are unattainable in any subject so long as the wonderful plan of a gradual unfolding from modest origins toward higher goals persists in the unfathomable scheme of the universe. Hence, no man or group of men possessed of the gift of discovery and invention were allotted sufficient physical and mental longevity to utter the only and final words on any subject. Unending discoveries and improvements are the privileges of future generations, and therein lies the greatest incentive.

There are originators whose fount endures to the last moment of their mundane existence; many others there are whose originality is limited and soon exhausted. The glory of this latter group is not minimized in the least when they are sufficiently prudent to encourage, recognize and revel in the achievement of those destined to augment and perpetuate their beneficent works. Any originator who becomes obsessed with the idea that he alone can point the way to progress becomes deplorably self-efface.

All branches of medical science have come into existence in response to a demand for the alleviation, correction and prevention of the sufferings of

mankind. Therefore the value of each branch is measured by its success and its availability. If only wealth can avail itself of any of the requisite medical relief, if only a few elect (elected by self-ordained electors) are chosen to learn and practice a medical specialty, some corrections are in order. Why insinuate that it requires supermen to perform work that does not require the mystic powers of a Houdini? Orthodontia was founded, practiced and advanced by mortals of average good sense. Like everything else it has its peculiarities and apparently insurmountable difficulties. Some of these have been overcome and others await possible solution, for "the supernatural is only the natural not yet understood."

The study of any specialized branch of the healing science and art requires primarily coordination and focusing of the fundamental sciences pertaining to such special training. General practice and specialized departments of medicine are based upon the same fundamental scientific knowledge. In other words, there cannot be one kind of anatomy, physiology, pathology, chemistry, etc., for the undergraduate preparing himself for general practice and another kind of the above-mentioned fundamentals for post-graduate study of any specialized branch of dentistry.

No phase of orthodontia is beyond the comprehensibility of any graduate of dentistry. Parenthetically, let us state that the first selective process devolves upon the dental college. If this is conducted as it should be, the first sentence of the paragraph can be taken literally. The achievements of anyone who studies orthodontia will be on the same plane as his results in any other branch of dentistry. All human beings are subconsciously consequent.

Orthodontia has its indisputable place in the healing art—no less and no more. No, my friends, the continuance of the human race does not solely depend upon the correction of malocclusion of the teeth. In fact there are many who think that other branches of medicine contribute more and are more essential to the sustenance of life than our overworshiped specialty.

The orthodontist is a molder of the bones of the face. Therefore, a knowledge of the possibilities and limitations of bone development is of the utmost importance. The greatest mystery surrounding the problem of bone growth is the determination, rather the predetermination, as to how promptly and how well any given case will respond to the stimuli of orthodontic treatment. However, this mystery is not peculiar to orthodontic treatment. Every pathologic condition encountered in the realm of medicine is enshrouded in the baffling mystery under the caption, "variations in response to treatment."

No course can be of sufficient thoroughness and duration to depict all possible combinations of factors which impede orthodontic treatment. The basic principles of treatment are all that can ever be taught in any school on any subject. Every human being is endowed with a brain which must be exercised, and no better exercise than the application of one's school learning to the practical problems of everyday life has as yet been recognized.

The clinical phase of orthodontic instruction is the difficult problem confronting schools and is insurmountable if it be required that students treat and observe cases from beginning to end. If that were demanded, even a

twelve month uninterrupted course is insufficient. Likewise, the dental college courses would be inadequate because of the inevitable intervening vacation periods.

It does not require a great deal of time to teach postgraduate students the application of their knowledge of the fundamental sciences to orthodontia. If it is found that the fundamental branches have not been taught thoroughly, then the profession has a right to enter urgent complaints with the colleges and boards of dental examiners.

But why worry about this. Has orthodontia not undergone an experience of thirty years, during which time—let us ask—have competent, progressive and successful orthodontists been produced by private postgraduate schools? If the Grand Man of Orthodontia imagines any disappointments and remorse about his own efforts to develop competent men able to perpetuate and improve the specialty he fostered, I feel that such a sentiment is unfounded and that any disappointments are readily attributable to another explanation.

In view of the present chaotic upheaval there is a tendency in certain quarters to oppose postgraduate instructions of the kind which developed the able pioneers of orthodontia. As yet, no method which is better and more practical and feasible than the original Angle School type has been found.

Perhaps one way to approach a solution of this problem would be to inquire of the Angle School graduates of the first five or six classes whether:

They could have undertaken the study of orthodontia if a one year course had been mandatory?

If so, would it have been necessary or worth their while?

Was their knowledge and skill as practitioners of dentistry a hindrance or a benefit?

Were they failures in practice because of the short course?

Did they ever graduate in any subject and discover that there was nothing further to learn about that subject?

What improvements can they suggest?

It seems to me that the plan of carrying on cases in a postgraduate school uninterruptedly so that students of the practical short time courses can be shown a large variety of cases at various stages of treatment is the most satisfactory method attempted to date. The patients served in a clinic of this kind are derived from a class of people who cannot afford to pay the fees demanded in private practice. The school is entitled to a moderate fee from such patients. There can be no valid objection to this method because it is a great benefit to mankind and a mitigation against the indictment that orthodontic treatment is dedicated to the children of the rich only.

Of course, it would be more desirable to have state or privately endowed institutions to carry on all educational matters—but where are they? Deplorably absent. Orthodontia is still in an embryonic state during which it has to be mothered by its progenitors. There is a danger that the orthodontia enthusiast will persuade a few schools to institute orthodontia courses of a prohibitive nature and hence doomed to failure.



All that can be imparted to a student in any course on any conceivable subject is typical matter. The innumerable factors which are likely to enter into any problem produce an infinite variety of effects. No instructor has ever been granted a sufficiently abnormal lease on life to have come in contact with and solved all effects appertaining to his subject. How, then, can any course be sufficiently complete and of sufficient duration to eliminate the graduate's need for ingenuity? Nor, in accord with nature's laws, would such a paralysis of mental effort be desirable. Progressive accomplishments of mankind are stimulated by the necessity of overcoming obstacles.

I still heartily support the ideals for advancement of dental education which I supported so urgently many years ago as a member of the Educational Council of America and as one of the founders of the Dental Faculty Association of American Universities. Nevertheless, I must concede that all virtues and pleasures have their limitations beyond which they are converted into pernicious activities and pain, and so the various phases of education have their limitations.

There is one university which is rarely mentioned, although it is the school in which every successful man has taken one or more involuntary courses and that is the University of Hard Knocks. This training must be reckoned with alike by the self-made and the pampered graduate. The sooner the first course is taken, the better. There is a possibility for one to remain in the schools bearing melodious names until he loses the courage to enter the University of Hard Knocks, and that is one of the difficulties which besets the rich man's son. He cannot sidestep it if he would. This is one of the reasons why the melodiously named schools should place their facilities within reach of the poor boy. Prepare him for the Hard Knock University and he will make good. If you disagree with me, study the biographies of the great orthodontists. In the language of Dr. Dewey, "the question is: Do you know it? It is not a question of where you got your education." May I add, "or how short a time it took you to get it."

## CASE REPORT DEMONSTRATING THE ADVISABILITY OF COMPLETE X-RAY EXAMINATIONS BEFORE STARTING TREATMENT\*

BY HENRY F. HOFFMAN, D.D.S., DENVER, COLO.

IT IS the intention of this report to show the result of taking too much for granted, depending too much upon the visual examination, and starting treatment without a complete x-ray examination. It is not intended to demonstrate the treatment employed nor to place special emphasis upon the final result.

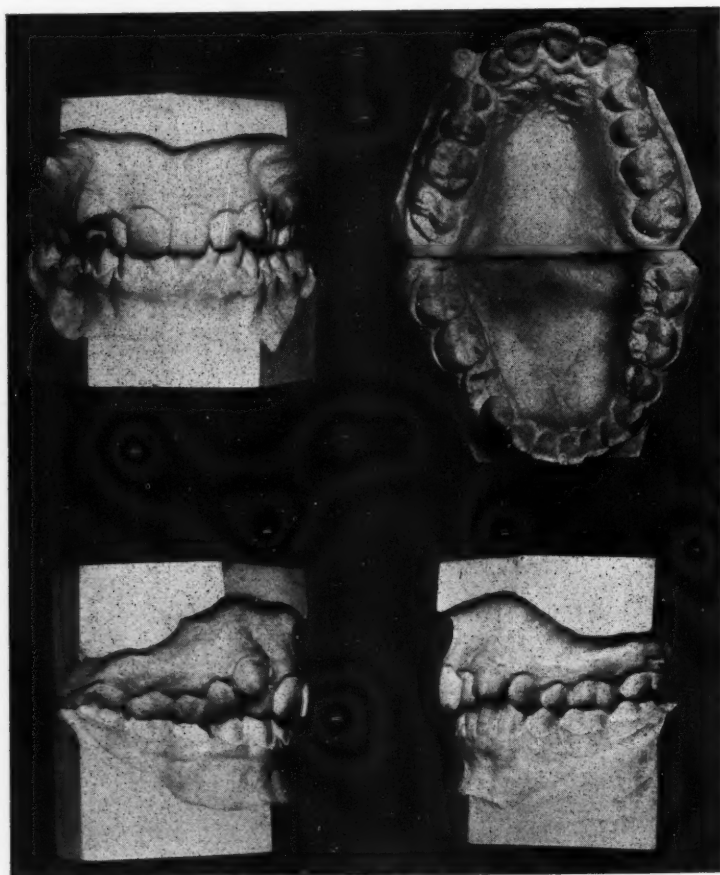


Fig. 1.

This was approximately a Class I case. Treatment was started in December, 1921, when the patient was sixteen years old.

The mandibular left second premolar was missing; the first premolar was in proximal contact with the first molar (Fig. 1). The mandibular right sec-

\*Read at the twenty-eighth annual meeting of the American Society of Orthodontists, Estes Park, Colorado, July 15-20, 1929.

ond deciduous molar was still in place and badly decayed (Fig. 1). The right deciduous molar area was radiographed showing the second premolar absent (Fig. 2), and it is to this particular abnormality that I wish to call attention.

Knowing that the mandibular right second premolar was absent, I assumed that the left one was also absent because of the relation of the left first premolar to the first molar and the appearance of the surrounding parts (Fig. 1).

Although I intended to radiograph the entire mouth, it was not done at the time but was neglected for a year. The case was treated in the belief that both mandibular second premolars were absent.

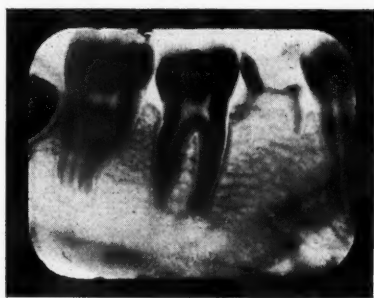


Fig. 2.

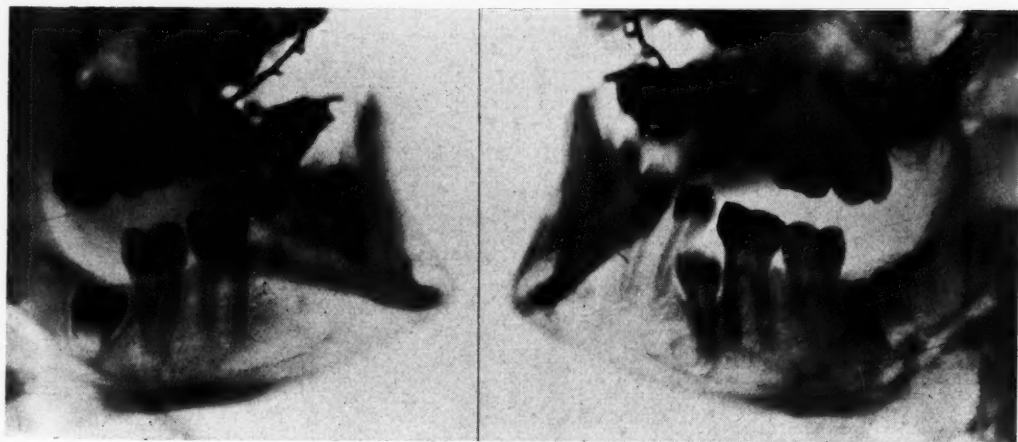


Fig. 3.

After treating the case for a year, the maxillary canines being in position and the occlusion reasonably good without altering the mandibular premolar spaces or shifting the occlusion, I decided to shift the mandibular right molars mesially to close the second premolar space if the mandibular third molar could be expected to erupt and occlude properly with the maxillary second molar. The delayed radiographic examination was made at this stage, disclosing a perfectly good mandibular left second premolar (Fig. 3).

The question then was what to do with the premolar. Whatever was done necessitated a change of plan involving loss of time to patient and operator, humiliation to the operator and possible discouragement to the pa-

tient. Much of the treatment subsequently carried out in the mandible could have been carried on while treatment of the maxilla was in progress.

As this is not a dissertation on treatment, I need only say that of the several possible procedures I decided to reverse the second premolar spaces closing the right and opening the left, shifting all of the mandibular eight anterior teeth to the right (Fig. 4).

The median line of the mandible, which was originally to the left of the median line of the maxilla (Fig. 1), is now to the right (Fig. 4). The mandibular incisors which originally had a slight slant to the left now slant to the right.

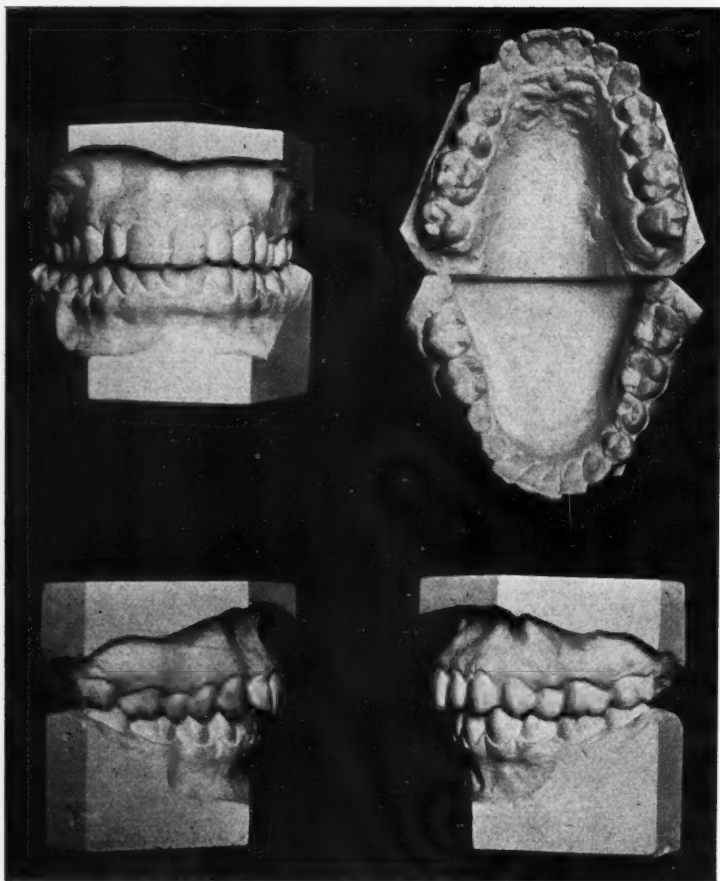


Fig. 4.

Treatment was discontinued in June, 1924. A removable lingual band was worn intermittently on the maxilla until January, 1929, when the last models (Fig. 4) and radiographs were made (Fig. 5).

The occlusion of the anterior teeth is not perfect, but I believe that the final result will prove more beneficial to the patient than if the space for the right second premolar had been retained and a substitute supplied, and I doubt whether in my hands the case would have shown as good final results had I attempted to place the anterior teeth in correct occlusion and shift the right molars forward to close the premolar space.



There is some rotation and lapping of the mandibular incisors, but the result shown is the condition four years after all appliances had been removed from the mandible.



Fig. 5.

In conclusion, I am not advocating this method of treatment more than to say that in this case it appears to have given satisfactory results after a reasonable number of years. Under the same conditions today I might treat the case differently. Certainly I believe I would arrive at a correct diagnosis sooner.

#### DISCUSSION

*Dr. C. M. McCauley, Los Angeles, Calif.*—When I was a student of mathematics some years ago I was told that certain truths were self-evident and would not admit of proof. My first thought regarding the discussion of the subject introduced by Dr. Hoffman was the



Fig. 1.

futility of such a discussion. His brief discourse has presented to us a truth, which to me seemed self-evident and would admit of no proof. No amount of discussion or argument could make it more true or add anything to his convincing presentation.

Upon second thought, however, it occurred to me that perhaps there are some who may be practicing orthodontia in this enlightened age who do not in every case resort to the x-ray as an aid to diagnosis. If this be true, a few words in support of the essayist's position may not be amiss.

In introducing a brief argument in support of the essayist we shall assume the following to be self-evident, namely; the pursuit of any calling which has to do with the life, health,

or happiness of fellow human beings, imposes upon the person engaged in such a calling a serious responsibility and solemn obligation. One element or factor in this obligation is preparation leading to efficiency in his calling. The other element is complete performance of all details known to the particular science to which his life is devoted. He should not be excused for the omission of any item, small or large, which might incur danger or result in harm to any one whom he might serve.

Fig. 1 shows a condition encountered by an orthodontist whose usual custom was to have full mouth x-rays made. Upon casual examination of this case it seemed so unnecessary to have an x-ray that he decided to omit it. Later, however, he determined to follow his usual custom. The cut shows you how seriously and easily we may get into trouble if we omit the x-rays even in cases where they seem so needless.

The mariner who carelessly sails the uncharted sea and steers his ship on a reef; the surgeon who makes his incision without cleansing the field of operation, resulting in septicemia; the dentist who attaches an extensive restoration to a tooth having a diseased root and produces cardiac complications; the commander of an army who engages the enemy in battle without providing his men with all available weapons of defense and meets defeat; the orthodontist who fails to look through and examine carefully the tissues surrounding the tooth roots, resulting in resorption of root tissue and loss of teeth; all of these commit offences fraught with danger to human life or happiness, and the offender should justly receive the condemnation of his fellows.

## ANTI-THUMB SUCKING DEVICE

By WESLEY C. DARBY, D.D.S., DES MOINES, IOWA

THE new anti-thumb sucking device which I have recently perfected consists of a small aluminum casting which is held in place on the thumb by means of adhesive tape. For older children the adhesive is covered with cloth tape, and the two are sewed together.

As you can see by the photograph, this device is placed on the *under* part of the thumb between the first and second joints. In this position it is im-

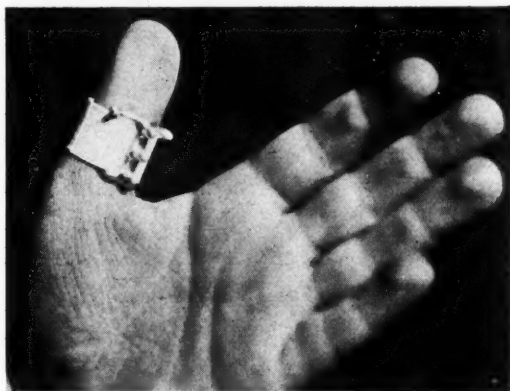


Fig. 1.

possible for the child to get it into contact with the eyes or face, yet it is in the proper position to prevent him from obtaining a complete "seal" with the lips when placing the thumb in the mouth. None of the movements of the thumb joints or of the hand or arm are interfered with while wearing this device.

Although this device has been out only a short time, it has already become quite popular.

## EVIDENCE THAT ONE MECHANICAL TEST IS WORTH MORE THAN A DOZEN EXPERT OPINIONS

BY JULIUS ADERER, NEW YORK, N. Y.

**S**PEAKING about expert opinions on elasticity and endurance power in reference to elastic platinum-gold wire, it is surprising how little we can depend upon opinion only and without the help of accurate mechanical appliances.

It is not the purpose of this article to mention trade names of materials employed for tests, or names of manufacturers, but rather to show how little dependence can be placed on opinion.

Many years ago I was positive in my opinion that a certain platinum-gold wire was more elastic than another, until I had occasion to employ a mechanical device to determine the elasticity of each. It was then demonstrated that the supposedly less elastic wire was considerably more elastic than the one I thought more so. That I am not the only one to make such an error has been proved only too often, and lately with two different platinum-gold wires employed for orthodontic appliances by Dr. X., who told me that he discontinued using "Y" wire because it was too elastic, and is now using "Z" wire, which though less elastic, was not subject to failure in the finished orthodontic appliances. Samples of these wires were supplied us by Dr. X. That the doctor was wrong in his opinion was suspected, and soon afterward was proved beyond a shadow of a doubt by mechanical tests. Contrary to his opinion, the "Y" wire proved to be less elastic than the "Z" wire. On the other hand, the "Z" wire stood the endurance test 5 per cent better than the "Y" wire. The doctor was invited to this office so that we could convince him of his error.

The testing outfit used is a simple affair, and I employed it in my office. Though simple in construction, it is as dependable as any other more complicated and expensive machinery. It may be employed for testing the elasticity of any wire as well as the wire's maximum endurance to the point of failure. The illustrations furnish side and top views of this little instrument. Figs. 1 and 2 show the movable arm shortened for the purpose of testing the endurance of the wire; and Figs. 3 and 4 have the arm lengthened and in its position above the protractor.

In further explanation let us state that this instrument consists of a small metal table in the center of which is mounted a round steel post in two sections. The lower section is stationary and has a hole through its side with a set screw at right angles to this hole. The upper section of the steel post turns like a turret and also has a hole through the side, which accommodates the iron arm with handle. On the other end of this arm is firmly soldered a seamless tube having a bore to accommodate wire from 17 gauge down to any thinner gauge.



The wire to be tested for elasticity is introduced through the tube and through the hole in the stationary post, and the set screw is then tightened to hold the wire firmly. The wire when so fastened will point to zero when the handle is shifted sideways so that the arm and the wire with it point to  $50^{\circ}$ ; then when the handle is released, it will stop at a certain point showing that the wire registers a certain permanent deformation, readable in degrees. This

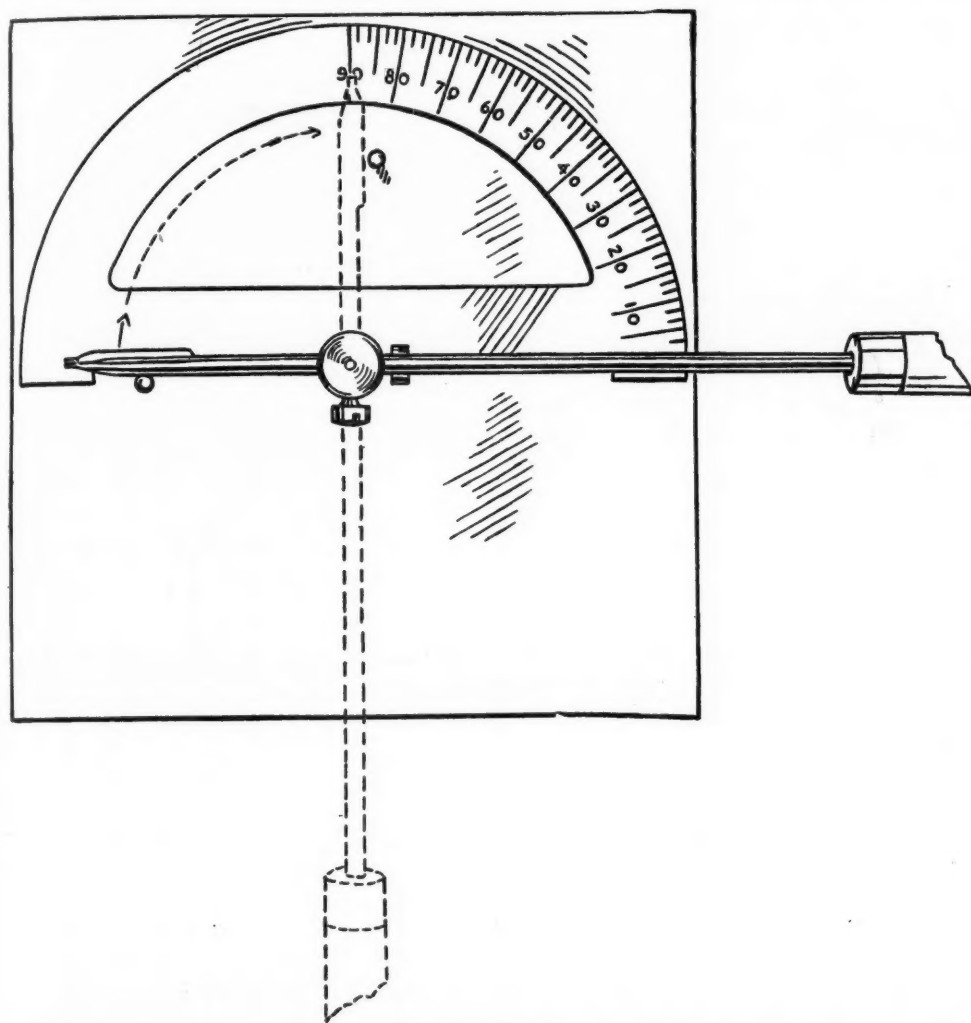


Fig. 1.—Top view with arm turned opposite direction and shorter distance from pivot. Also phantom view of handle at right angle.

permanent deformation will naturally be more extensive when the wire is less elastic. For the purpose of comparison we know of no more reliable instrument than this.

The tube at the end of the post permits wire to slide in and out during the deformation of the wire and release, and when released it does not permit the wire or the handle to move. In other words, it will remain stationary for the purpose of accurate reading of the permanent deformation sustained by the wire.

The reading is simple enough. For instance, if the arm is moved from

zero at the left to  $50^\circ$ ; and when released points to  $10^\circ$ , this particular wire will show a permanent deformation of  $10^\circ$  in  $50^\circ$ ; and if another wire to be tested is brought from zero to  $50^\circ$  and released, and the arm points to  $20^\circ$ , you will note that the latter wire is considerably less elastic because the permanent deformation points to  $20^\circ$ . It is understood that wires to be tested must be alike in gauge and should also be annealed together in either an electric furnace or some sort of gas heating apparatus. Heating in the open flame is not advisable unless the wires are previously tied with thin iron or

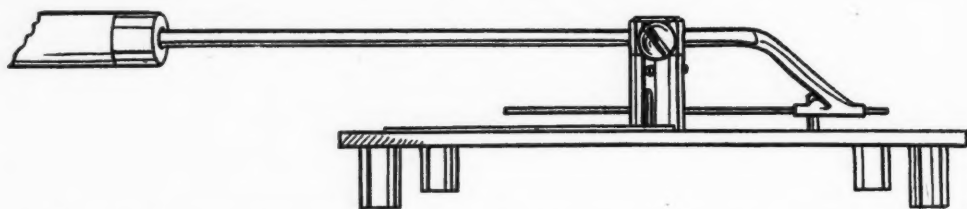


Fig. 2.—Side view with tube at shorter distance from pivot, for endurance test.

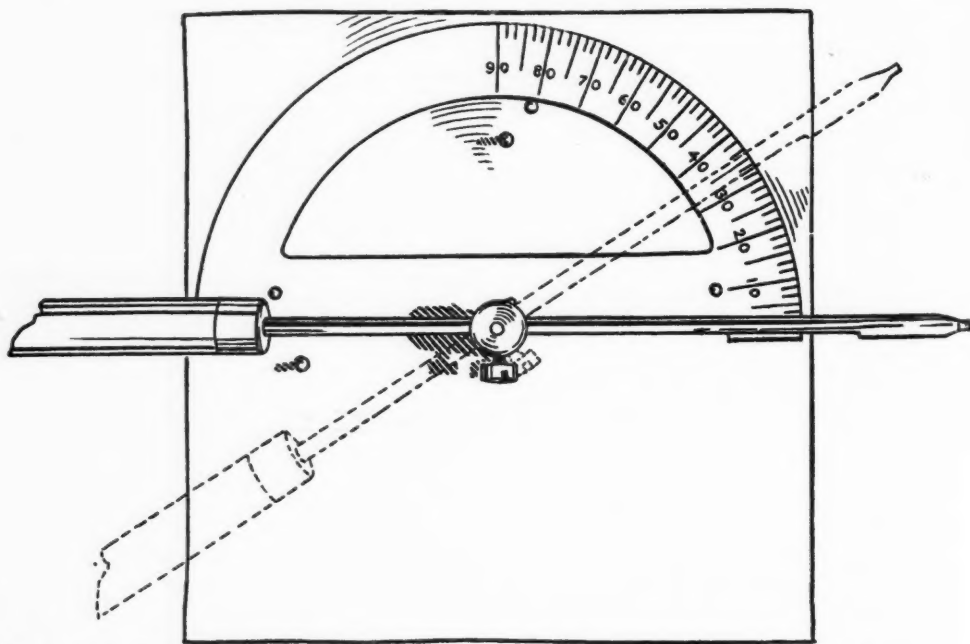


Fig. 3.—Top view with arm above protractor, for elastic test. Also phantom view of handle turned.

so-called binding wire; if heating is then not uniform, both of the wires will be unevenly annealed and neither will have any advantage.

For testing wire for endurance with this instrument, the screw holding the arm is released and the arm turned in the opposite direction so that the latter will be on the right side of the projecting post. The arm should then be shortened so that the tube on its end rests on the right side of this post. For testing the endurance of wire, the protractor is not necessary, but for endurance tests the two projecting posts are absolutely necessary for an impartial test. These two posts prevent the arm from being moved further than at right angles, forward and back, until the wire to be tested fails. For the

purpose of comparing two platinum-gold wires with each other, they should be of one gauge and should be annealed together, or tempered together, or if so desired, quenched together, otherwise the test will be useless.

If we now introduce such a piece of wire through the tube and through the hole in the stationary post, and fasten the wire tight by means of the set screw, so that it cannot turn on its axis, and then move the arm from one projecting post to the other and count each move, we shall find that a good

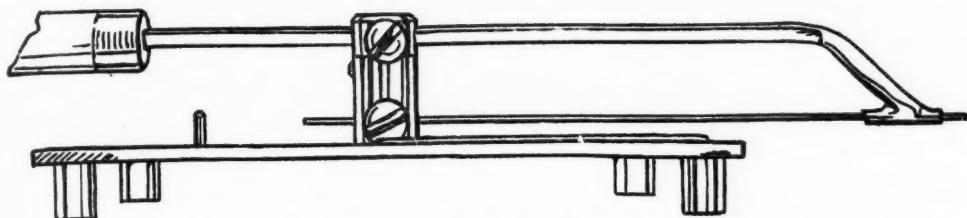


Fig. 4.—Side view showing wire through tube and fastened with screw on the end.

elastic wire, 18 gauge thick, annealed but not tempered or quenched, will stand about fifteen bends, counting from start to post as one, back to the other post two, and so on until the wire fails or breaks. One wire so tested stood twenty-three bends before it failed. It is understood that when platinum-gold wires are annealed and quenched, the test will register a greater endurance, whereas a wire tempered at  $780^{\circ}$  F. will show less endurance than wire annealed to about  $1500^{\circ}$  F. without quenching.

*(To be continued.)*

## AMERICAN SOCIETY OF ORTHODONTISTS

TWENTY-EIGHTH ANNUAL MEETING  
JULY 15-20, 1929

### Report of Round Table Discussions

The following reports of the Round Table Discussions are not endorsed by the American Society of Orthodontists, but are the opinions of groups of members and guests.

**Table No. 1.**—Topic: Consideration of the individual normal.

Topic Leader.—Dr. James C. Allan, New York City.

(1) Is it wise to go on treating cases for years, trying to get an ideal normal result? The answers were: no, 13; yes, 2.

(2) Do you believe that the amount of overbite should be the same in all cases? Thirteen answered no, and 1 answered yes; 1 did not answer the question.

(3) Would you attempt to open the bite of a case where the teeth in both arches are in normal contact and normal arch form, the molars and canines lying in their normal relations mesiodistally? The answers were: no, 8; yes, 2, and 2 answered the condition did not exist.

(4) Do you think that the result of such treatment would be permanent? Nine answered no; 3 answered yes, and 1 turned in no answer.

(5) Have you any way of deciding what is the individual normal for any one patient? Five answered no, 1 answered yes, and 1 did not answer the question. One believed the ideal normal was individual normal for all cases. Two believed that occlusal forces after treatment would establish the individual normal. Three believed that by common sense and experience they could determine the individual normal. Two believed the nearest means of determining individual normal was by engineering methods.

**Table No. 2.**—Topic: Are the vitamin values and the calcium and phosphorus ratio of the blood, factors in the orthodontic problems?

Topic Leader.—Dr. J. A. Burrill, Chicago, Ill.

This is probably an unfair question to ask of a body of orthodontists inasmuch as the problems of the vitamins and the blood calcium and phosphorus ratio are not yet settled in any way definitely but the most of the replies to the questionnaire would indicate that there is possibly a more direct relation than we realize at present.

As an indication of the correctness of this statement, I wish to recite a positive trend in the findings of work being done at the Sprague Memorial Research Institute at the University of Chicago on pregnant women. They have found that the calcium-phosphorus ratio of the blood can be readily maintained during pregnancy by a diet rich in vitamin C and vitamin D up to about the end of the sixth month, but at that time the calcium demand is so very great that rapid drop in the calcium of the blood usually occurs. This is about the time of the most rapid deposition of calcium in the formation of the bones and teeth of the fetus.

It is quite definitely the opinion of research workers that vitamin C or vitamin D, or both in combination, play a very important rôle in calcium metabolism.

(1) Recent work has indicated that caries, gingivitis and allied conditions are due, primarily, to dietary deficiency. What relation have you noted between the above conditions and orthodontic imperfections?

The general answer was that metabolic disturbances due to vitamin deficiency are probably very important predisposing factors in caries, gingivitis and allied conditions.



(2) Is delayed dentition related in any way to the rate of growth or development of the child, late maturity for example?

A delayed maturity is frequently due to thyroid deficiency. There appears to be a definite relation between delayed dentition and rate of bone growth and general development.

(3) Is it possible, by feeding citrus fruit or by administering vitamin D, to promote the calcification of the alveolar bone so that the teeth remain in place after the bands have been removed?

The answer was that in cases where the patient's diet has been deficient in vitamins, the feeding of citrus fruits and the administration of vitamin D probably would assist in improving the bone development around teeth which have been moved.

Again, to quote from the findings of the Sprague Memorial Research Institute, "Patients afflicted with bone absorption have been found invariably to be living on a diet that is deficient in vitamin C. The diet of about 50 per cent of these patients was also deficient in vitamin D. Administration of a diet containing ample amounts of these vitamins has led to bone deposition and regeneration in all of the cases studied thus far."

(4) Are children with extensive malocclusion apt to have derangement in structure in other parts of the body? Have there been periods of mild or frank rickets or scurvy?

Extensive malocclusions are very frequently associated with rickets, but scurvy has not been recognized. Frank Scurvy is comparatively rare. It is manifested in the pulp (Howe), but the first visible changes occur in the gum tissue. The gum tissue may be merely mottled in appearance, or it may be slightly inflamed but not sufficiently to cause hemorrhage. These symptoms and ulcerated stomatitis may be indications of scurvy. This mild chronic form of scurvy may lead, in early childhood, to a malformation of the jaw.

(5) Do the results of Dr. Percy Howe's animal experiments throw any light on our problems of tooth and bone development?

Percy Howe has been able to produce, in animals, lesions that seem to resemble those with which the dentist is confronted in man. These defects were produced by diets that were deficient in both vitamins C and D, predominantly in C. We cannot, of course, transfer these results confidently to man, but Howe's experiments are certainly suggestive. They indicate the proper trend for research on the human subject.

**Table No. 3.—Topics: A.—What should the term "preventive orthodontia" include?**

Topic Leader.—Dr. Wyatt B. Childs, Macon, Ga.

Any discussion of the term "preventive orthodontia" should include a consideration of those factors responsible for the prevalence of malocclusion.

As to these causes for the prevalence of malocclusion among civilized races, there was a wide divergence of opinion among the members of this group—three said lack of function; two, diet; one, environment; two, early loss of deciduous teeth; one, habits; one, lack of mastication; one, nasal obstruction; one, civilization.

Obscure hereditary factors and other complex etiologic factors not clearly understood, in the opinion of eight of this group, could not be included; two thought they should be included; one replied that it was speculative but could do no harm in the study of the causes of malocclusion.

The majority were of the opinion that prevention or interception of malocclusion should begin with the prenatal period.

It was unanimously agreed that the average physician or pediatrician is not fully cognizant of his duty in the prevention of malocclusion and other maldevelopments of the bones and soft tissues of the face, and that the period from birth to six years of age, when the forces of occlusion are most actively operative, is the period most neglected by both the general practitioner of dentistry and the orthodontist.

As to the most frequent and fruitful local cause of malocclusion, five were of the opinion that loss of deciduous or secondary teeth was responsible; one, lack of function; one, habits; one, neglected deciduous teeth; one, no opinion.

Disturbances of nutrition and function were agreed to be primarily responsible for the failure of osseous structures to develop in the great majority of cases of malocclusion.

B.—How may this best be taught the general practitioner of dentistry?

It was the consensus of opinion that less than 10 per cent of the general practitioners of dentistry refer children under six years of age to the orthodontist for observation. A number estimated that as low as 1 per cent referred children during this period to orthodontists. Less than 20 per cent were estimated to restore carious deciduous teeth with materials that would maintain their mesiodistal diameters, and by some of the group this percentage was placed as low as 5 per cent.

Without exception, this group expressed the belief that the general practitioner of dentistry is indifferent to fundamental orthodontic knowledge of diagnosis and treatment of malocclusion of the deciduous teeth, and that this was most probably due to the failure of the dental colleges to teach the undergraduate students these fundamentals.

It was agreed that the logical place to begin work in the promotion of children's dentistry and preventive orthodontia was in the dental school.

In the interest of promoting children's dentistry it was thought that it would be practical and advantageous for the American Society of Orthodontists to sponsor the publication of a series of educational orthodontic articles in dental, medical, health, parent-teacher, and other publications. This, however, should be done with care and tact so that no appearance of advertising would be shown.

**Table No. 4.**—Topic: Open-bite cases, their treatment and degree of success of retention.

Topic Leader.—Dr. W. J. Furie, Long Beach, Calif.

A questionnaire was sent to many of the orthodontists in this country and in Europe, and the answers I received were very good. I believe that right now I know more about open-bite cases than any man in the country, after reading all those reports.

We had men at our table from all parts of the country. The eastern orthodontist has a successful secondary treatment, and the primary treatment seems to be fairly satisfactory. The eastern orthodontists have the most successful way of treating these open-bite cases if their instructions are carried out. They recommend a change of climate and send the patients to California for retention or secondary treatment.

(1) Do you make an annual charge? They do not make an annual charge. That is where we western orthodontists have our difficulty in collecting a secondary fee.

I believe the most interesting report we had from any of the men at our table was from Dr. Pullen. He reported a case of open-bite and treated it by a grinding process that extended over a year and a half, retaining the cusps. This slow process allowed the deposition of secondary dentin. He ground a little at each sitting, and very little sensitiveness was noticed during this treatment. Dr. Pullen is preparing a clinic on this particular case, or a few cases that he has treated in this way, which he will give at a later date. He said he had gone to this means because he had had so many failures in the past.

There are signs of encouragement on these open-bite cases. Some of the reports we received were encouraging, and all the men at the table today felt rather encouraged.

These are the five questions sent to thirty orthodontists in this country and Europe:

1. What in your opinion is the best age to start treatment to obtain best possible retention?

2. What kind of appliance do you recommend for primary treatment and over what period of time?

3. What kind of retaining appliance for secondary treatment, and over what period of time?

4. Instructions to patients on starting secondary treatment, and do you make an annual charge?

5. Is the retention of open-bite cases, so-called Class I or II (Angle), after correction successful in your opinion?

After reading the numerous answers to the questionnaire, we concluded that the primary treatment of these cases is satisfactory. The appliance used consists of a labial arch on

both the maxillary and mandibular teeth. The majority are using the McCoy open tubes while some use the Angle ribbon arch.

We are of the opinion that from the mechanical standpoint our next step must be an improved appliance for secondary treatment, preferably a removable appliance that can be worn over a period of several years' time if necessary, as an improved Hawley appliance.

I am satisfied, after spending a few hours in Dr. Lischer's office in St. Louis that our diagnosis is at fault. I believe his paper will prove to you conclusively that we do not know very much about diagnosing these cases.

We believe that in the next three years' time, with Dr. Lischer's contribution to diagnosis and the fact that we have agreed to concentrate our efforts to perfecting a retaining appliance, this will be accomplished. Then, truly, the orthodontist's greatest hazard will be overcome, and that particular type of suffering humanity will be greatly benefited.

**Table No. 5.**—Topic: In view of the increasing number of dentists engaging in orthodontia without proper preparation, what, in your opinion, is the best means of meeting this condition?

Topic Leader.—Dr. George A. Barker, Seattle, Wash.

Dr. Mann sent questionnaires out to his men but received only one answer. So I attempted during the discussion at our table to jot down what seemed to me to be the consensus of opinion on the questions Dr. Mann asked.

(1) Should men proposing to practice orthodontia have general operative experience? The answer at our table seemed to be quite unanimously yes.

(2) If so, what postgraduate training is necessary, in your opinion? Of course, there is considerable latitude in that question. In the following order the opinion seemed to be: university postgraduate or, as one of the men spoke of it, graduate course; private school course; office associations.

(3) What do you consider the best method of preparation? I suppose he means preparation for specializing in orthodontia. Again, the answer was: university graduate course; private postgraduate course; office association with older men.

(4) Should the college curriculum require majoring in orthodontia? We supposed, of course, this was for a man who was preparing himself to specialize in orthodontia. The answers were yes in that instance.

(5) What is your reaction to legislation by the various states to license men to practice orthodontia? The reaction seemed unfavorable at our table.

(6) Would the suggestion of a national board of directors, or examiners, similar to those established by the American College of Surgeons and the American College of Physicians solve the problem? This question did not get very much discussion because we spent a good deal of time on the preceding question, but everyone seemed to think there was at least a good possibility in that solution.

**Table No. 6.**—Topic: Treatment of neutroclusion associated with the supraversion of the mandibular anterior teeth.

Topic Leader.—Dr. E. B. Arnold, Houston, Texas.

I am very sorry to report that we did not get very far with this, in view of the fact that in my original letter asking for questions I did not get any replies, so I made up my own. At the table everyone suggested questions, but it was too late. I sent this questionnaire to fifteen men and received six answers as follows:

(1) Do you think it advisable to treat deciduous arches in these cases? Five answered yes; one, no; one answered he had never seen a case like that. Another said the question should have been different; that it would depend upon whether you were talking about type one with protrusion of the anterior or lingual version, but I thought that covered it. It was still neutroclusion.

(2) If you treat the deciduous arches, outline briefly your treatment and results obtained. One said, "Have never seen a case of this type where I thought treatment was indicated." Another said, "The removal of too long retained deciduous teeth with special

attention to the proper order and method, proper diet, exercise, and elimination of habits, if any." Another reports crowns on second deciduous molars and Hawley bite plane with success and failures. He used both and he had success and failures with the crowns, and also with the Hawley bite plane, or the vulcanite bite plane. Another reported that Ketcham's labial hook appliance was used with success after crowned molars failed. Another used the Oliver bite plane with fair results.

(3) If you have treated these cases, as above, do you find it necessary to treat them later in the permanent teeth? Four answered yes, and others did not answer.

(4) Do you use onlays, or crowns, on the deciduous molars? Five answered yes; one, no.

Do you find that there is an actual vertical development of the permanent first molar, or do you think the deciduous molar or molars are depressed? Most all answered that they thought a depression of the deciduous teeth, and very little vertical development, if any.

(5) After you have removed the onlays or crowns from the deciduous teeth, do you find that the bite closes or the case relapses after several months? That is to say, after you have taken your onlays off, do you get a relapse? Three answered that some relapse; others did not answer.

(6) Do you use vulcanite bite plane? If so, what are your results? Four answered yes, with good results; others did not answer.

(7) Do you use a wire lingual bite plane? If so, what are your results? Three answered no; two answered that they used it only in permanent teeth, results very satisfactory.

(8) If you have any treatments other than the above, please give them. I gave them plenty of latitude there, but the answers did not come in very well. Two said they used Ketcham's labial hook appliance; others did not answer.

(9) Do you think in some deciduous cases there is not only a supraclulsion of the mandibular anterior teeth but also a dropping down of the premaxillae? We had quite a bit of discussion on that question because nobody seemed to understand. I had one particular case in view, and I brought it with me. It seems as though the premaxilla bone at the canine region from right to left has simply dropped completely down, such as is found in cleft palate cases where we have deformities of the premaxilla; the lower occlusal plane or curve of Spee seems normal. In other words, there does not seem to be any supraclulsion of the mandibular teeth at all. It seems to be supraversion of the maxillary anterior teeth. Five answered yes; one answered that vertical growth is needed.

(10) Is not lack of vertical development, or growth, a very positive factor in producing supraclulsion of the mandibular anterior teeth? Four answered yes; another answered, "I think there must be some other factor involved."

(11) Is excessive overbite not a normal condition in certain stages of a normal developing arch? Four answered yes; two answered no.

(12) Do you think too early loss or removal of mandibular deciduous canines, instead of proper removal of deciduous molars, tends to produce this type of malocclusion? Two answered, "I do not know." One answered, "In a certain percentage of cases, yes." Two answered yes.

**Table No. 7.**—Topic: The extent to which prognosis and treatment are affected by our knowledge of or lack of knowledge of heredity.

Topic Leader.—Dr. George R. Moore, Ann Arbor, Mich.

Before I start on this report of our discussion of the problem of heredity, I will explain that it was not our hope to do much with the solution of the problem but to find out what the problem is doing to us.

With the conviction that there is a serious need for research in the field of heredity in relation to orthodontic problems, as well as in other related fields, it was our desire to ascertain by means of a concise questionnaire sent to representative members of the profes-



sion just how much our practical outlook is affected by these deficiencies in our knowledge of one of the fields essential to diagnosis.

Accordingly, the following questions were sent out: (1) On the basis of scientific observation, may heredity be accepted or must it be rejected as a causative factor to be considered in the diagnosis of dentofacial deformities?

(2) What dentofacial anomalies have come to your notice which may be hereditary?

(3) Do these hereditary conditions, in your opinion, limit the possibilities of orthodontic treatment?

(4) Do they contraindicate treatment in any cases you recall?

(5) Is diagnosis so predominantly a morphologic problem that it may be defined as the determination of the differences between the existing denture of a patient and the condition to be established? We wished to ascertain whether or not we are assuming an attitude toward the treatment of our cases which demands strictly ideal results from the standpoint of morphology, and whether we are going to ignore the other factors involved in a strictly accurate diagnosis of the dentofacial anomaly.

(6) Can we repair the hereditary faults of each generation as they arise?

In reply to the introductory question, the answer has been unanimously that we must accept heredity, one reply being qualified by saying that hereditary factors are difficult to evaluate, which all will admit is very true.

Answers to the question, "What dentofacial anomalies have come to your notice which may be hereditary?" produced almost as many lists of possible hereditary conditions as persons sending in replies. Among them were anomalies of number and form of teeth, deep overbite, some cases of lapping of central incisors, deficiency in apical base, open-bite, and abnormal frenum labium. Several mentioned Classes I, II, and III (Angle) cases. Of course, those mentioning Class I did not usually mention Class II. It worked that way throughout. One stated that hereditary anomalies were too numerous to mention.

To the question, "Do these hereditary conditions, in your opinion, limit the possibilities of orthodontic treatment?" 90 per cent answered yes. Those who answered no did so with the idea of separating treatment from retention, saying that treatment possibilities are not limited, but retention possibilities may be limited or A-1 results may be prevented. One recalled limitation in cases of missing teeth only.

As to treatment being contraindicated by hereditary conditions, 25 per cent recalled such cases and 75 per cent could not. One recalled a case of macroglossia with consequent spacing of teeth which he considered as contraindicating treatment. Another conceded that his treatment would in some cases be altered because of hereditary conditions which might exist. Dr. H. B. Wright of Philadelphia mentioned that he has examined 67 cases of spaced teeth with or without macroglossia, and he has come to the conclusion that these cases should not be treated. He referred to a close coordination between this condition and certain races, and we all bore him out in that.

To the question, "Is diagnosis so predominantly a morphologic problem that it may be defined satisfactorily as the determination of the differences between the existing denture of the patient and the condition to be established?" seventy-five per cent replied no, which seems very forcibly to express unwillingness on the part of the profession at large to accept strictly ideal standards in outlining treatment possibilities. It also indicates that a comfortably large proportion of the profession recognizes that some other things besides inefficiencies in mechanical procedure may limit or entirely preclude treatment.

One man defines diagnosis as "the determination of the condition present," and goes on to say that "the condition to be established is determined secondarily from our diagnosis."

Another includes etiology within the realm of diagnosis. Another very concisely states that "the existing denture has no more to do with diagnosis than have height, age, response, muscle tone, posture or radiographs of the hand." So much for a very favorable attitude toward our limitations.

The last subquestion, "Can we repair the hereditary faults of each generation as they arise?" received no unqualified yes answers. Twenty per cent replied no, and the remainder

bore such qualifications as these: "Not always fully"; "I doubt it"; "We cannot, whether they are inherited or acquired"; "We have some failures"; one was kind enough to admit.

To conclude, I shall quote from Dr. J. V. Mershon's letter, "Who can tell where heredity ceases and environment begins? By virtue of all that we say, we must believe that we cannot ignore heredity in our orthodontic procedures."

**Table No. 8.**—Topic: Impacted maxillary canines: their treatment.

Topic Leader.—Dr. Allen E. Scott, San Francisco, Calif.

About ten years ago I treated a case in which the two maxillary canines descended upon the two laterals and absorbed these teeth clear off to the crowns. The teeth were extracted in my own office without any pain to the patient because of the absolute absorption of the roots. At that time I became very much interested in these maxillary canines and their impactions in the various positions which they assume. We might have included mandibular canines also, but we did not want to open up too large a field for discussion.

In my opinion, these canines are very important because of three things: (1) they will absorb centrals and laterals; (2) the canine is more or less the keystone of the arch, and therefore a very important tooth, dentally speaking; (3) it is extremely difficult to supply an artificial canine properly. So for those three reasons I consider these impacted canines very difficult.

Another thing that led me to become very much interested in this subject was the fact that after some little observation I discovered that a great many thought some of these canines, which lie across the roof of the mouth in the hard palate, are not amenable to treatment. In my opinion, the prognosis is extremely good. Out of about twenty-five of these teeth, I have been unable to bring down only one into position. This was in a young lady twenty-six years of age who happened at that time to be engaged to a dentist, and if there was one tooth on earth that I wanted to bring down that was the one, and that was the very one I failed on.

(1) Do you extract maxillary impacted canines? I received all kinds of answers to this question. One man said he did not extract them; he let the exodontist do it. But the consensus of opinion seems to be that when conditions are favorable an effort is made to move them into position. I will leave it to you as to what favorable conditions are. That may mean most anything.

(2) Do you move them down to their proper places? The consensus of opinion there seemed to be that when conditions were favorable also an effort was made to move them down to their proper places.

(3) What is your technic for moving them down? We had just as many variations in technic as we had answers to the question. We sent out fifteen questions, and received about fifteen different technics for moving these down. Most of them seem to agree that it is good procedure to drill a hole into these canines and place some kind of a pin in them. One man said he was successful in swedging the cap. There is another way to do this which no one mentioned, but it is possible to expose the canine and make a spiral spring, something that resembles a coiled rattlesnake before it strikes, and cement this onto the tooth by using a copper cement and placing a warm spatula on the cement about the time it is setting which will hasten the setting. Some of the spiral springs will stick very tightly, and it is perfectly possible to move them down without boring a hole in the tooth. I still believe that perhaps the most satisfactory procedure is to bore a hole in the tooth. Also, you would have to bore the hole in whatever part of the tooth happens to be exposed. It was also stressed that it is highly desirable to get plenty of anchorage, because if you are not very careful you will find the molars moving into the antrum instead of the canine moving down.

(4) About how long does it take? The span of life is only about seventy years, so I suppose that is about the limit. Most of the men seemed to think it required from one to three years. In my opinion, if it cannot be done in a year to a year and a half, there is not much use of giving it any further treatment.

(5) What are your age limits for moving them down? The consensus of opinion seems to be from ten years up. I saw a woman one time who showed loss of a deciduous tooth

when she was fifty years old. The permanent canine was there, and we were successful in getting that down into place. Of course, we do not know how much good we did. Perhaps the tooth would have come down without any treatment at all. I asked one man one time how he told which cases not to treat, and he said he treated them all so he would be sure of getting the right ones. About that time I decided that all wise men came out of the East.

(6) Have you had any unfavorable results? One man said, "Hell, yes." But most of the men said with modesty that they would have to admit they had some unfavorable results. The point was stressed that care must be taken when this pin is cemented in the tooth not to expose the pulp. That is highly desirable.

(7) Do you insist on complete x-rays? Everybody agreed that x-rays were required at all times.

**Table No. 9.**—Topic: Should orthodontia be more widely separated from dentistry? Topic Leader.—Dr. Oliver H. Devitt, Denver, Colo.

I might state that we had two deans at our table and one instructor from another school, so we were well represented.

Because of the amendment to the dental law passed in Arizona and the general interest shown elsewhere, this question was chosen as a timely subject for the round table discussion.

How far should instruction in orthodontia be carried in our dental schools? We had a good deal of discussion as to whether it was for the benefit of the general practitioner, or whether we wanted to create a specialist out of the student.

We were unanimous on question (1), Should we have more instruction in dental schools in orthodontia? We wanted to elaborate on this question, but we decided to strike out etiology and diagnosis because we really did not have time for it.

(2) Should a dental student be required to make a complete study in all the branches of dentistry in order to become a skilled orthodontist? A vote on that was: 7, yes; 3, no.

(3) Should there be a state examining board for orthodontists? We were unanimous in that as no. There need not be a separate examining board. At least one member on the board should be an orthodontist, and a man specially trained in orthodontia could not be given an examination of any consequence by a board consisting entirely of general practitioners, or perhaps men from the other specialties in dentistry.

(4) If an orthodontist desires to change his residence to another state, should it be necessary for him to keep up in his theory and technical skill in other branches of dentistry to pass the board of examiners? We were unanimous that he should keep up in his theory.

In the final analysis, whatever is done in legislation or otherwise should be given very careful consideration. If an improvement in the instruction in dental schools is desired, a committee from the American Society of Orthodontists should meet with the American Association of Dental Schools.

This question is one which will be very difficult to solve in a manner which will be beneficial to all concerned, namely, the public, the dentist and the orthodontist.

Another angle to this question is, what is to be done with the man who sets himself up to be a specialist with no special preparation and continues with his gross mutilation of the mouths of children?

**Table No. 2.**—Topic: What is the most important problem confronting orthodontics today?

Topic Leader.—Dr. O. W. Brandhorst, St. Louis, Mo.

Dr. Woodbury's question was sent to me. His report, as well as the tabulations from our discussion, is as follows:

Instead of asking a series of subquestions as suggested, let us amplify the above question as follows:

In what region of our field at our present stage of development should we be concentrating our thought and effort so as to stimulate most effectively our growth as a health

service to the community? Fifteen questionnaires were sent out, and thirteen replied. To this we added five opinions at our table. In other words, eighteen replies were received in answer to this question.

It is perhaps indicative of the present trend in things orthodontic that about 75 per cent of the replies showed a concern for a better understanding of the phenomena that confront us.

Three stressed the social implications, feeling that we are only reaching a few of those who need our services. Of these, one states that our problem is to make "our services available to greater numbers without sacrificing efficiency or the individual ideal." Another said, "Anything in the nature of a health service, such as the greatest good to the greatest number, does not exist at the present time." The third asks the question, "Is orthodontics rendering a real health service?"

Three were concerned primarily with matters technical. One felt that our chief need was a simplification of appliances, and the other two said that retention constituted our great unsolved problem.

The 75 per cent referred to above direct our attention to the need for a clearer understanding of the following: (1) etiology, (2) diagnosis, (3) the process of development, which will be recognized as closely interrelated. Also the desire is expressed that we might exercise prevention more adequately through cooperation with the general practitioner and by guiding the nutrition of the child. There is also the feeling that normal function (presumably chiefly muscular) should take the place of appliances as much as possible. There are two references to the necessity for research.

Some opinions that should provoke discussion are passed on just as they were received:

"Unless diagnosis can be standardized with a correct terminology, there will always be differences of opinion as to the method of treatment."

"Our most important problem in our present stage of development is the cultivation of a rational diagnostic sense based on a physiologic conception of a growing part."

"The most important problem confronting orthodontics today, considering only the welfare of the patient, is to know when to treat and when to stop the treatment."

Conclusions: It is difficult to sum up concisely such a varied response to the question asked. Perhaps on the whole it may be described as a feeling that if we could understand more fully and clearly and evaluate more precisely the phenomena we are called on to deal with, we could attack the solution of our problems more intelligently. It is suggested that this points definitely to intensive, extensive, patient research under the very best leadership obtainable.

#### Table No. 11—

Topic Leader.—Dr. A. B. Brusse, Denver, Colo.

This is truly impromptu, so you must forgive this presentation.

This round table was composed mostly of general dentists and commercial men. One member of the table stated that the study of medicine is in itself a broad general education; that every Class A dental school has the same preparation, and that the graduate should select his specialty after graduation. A little time should be given in the curriculum for the teaching of orthodontia, and postgraduate work in this subject should be available in every university.

A dental salesman stated that he had traveled from coast to coast, and from his viewpoint the general man did not seem to be interested in orthodontics, that he was afraid to attempt to treat cases on account of lack of knowledge of orthodontia. He suggested that the city and state societies should include more orthodontists on their programs. Also, that the orthodontic societies should teach the general man how to treat simple cases, but I have not seen a simple case yet.

Dr. Carter, one of Denver's leading dentists, stated that many cases are referred to orthodontists by general dentists. These patients are advised to consult the orthodontist, but they do not carry out the advice given them. Dr. Carter suggested that the Parent-Teachers Association should receive lectures from the orthodontist in regard to the importance of orthodontic treatment.



**Table No. 12—**

Topic Leader.—Dr. R. L. Gray, Denver, Colo.

Table No. 12 is in much the same position as Table No. 11 was; we went in without any instructions. However, realizing that weighty problems confronted us, we put in several minutes discussing what subjects we would undertake to discuss. Every minute of time was taken up by things of a very weighty nature. We thought that if we could settle one question at this table we would have served a purpose. Consequently, the subject we chose for our topic was: Where shall we meet in 1930?

There was not very much discussion offered on this question. There were eleven men at that table from all over the United States. Practically every state in the Union was represented, with the exception of Tennessee. So it was the unanimous vote of all present that we meet in Nashville in 1930.

**Table No. 13—**

Topic Leader.—Dr. H. L. Morehouse, Spokane, Wash.

If the rest of these outlaw tables think they have anything on No. 13, they are badly mistaken because we were worse off than No. 12, or even Brusse's table, as we inherited one child's dental specialist, Dr. O'Donald of Wichita, Kansas, and Dr. Mallory Catlett, the exodontist from Denver. Then we drafted another dental specialist, Dr. Paul Barker, also of Denver. If you think of a bunch of orthodontists had very much show with that list of fellows, you are badly mistaken.

After consulting with Dr. B. Frank Gray on my right at the table, we thought we might start a rather warm argument if we selected the question of the proper treatment of deciduous teeth with pulp involvement as the first question; and whether all the decay should be removed from deciduous teeth with danger of pulp involvement. It was not very long before the fireworks started. I asked Dr. Paul Barker to lead the discussion, and he started off in good shape. A number of the other orthodontists broke in on his elaboration, and then Dr. Catlett opened up with a machine gun fire.

After the meeting, they asked me what I was going to report, and I told them I was really undecided, but that I would tell the meeting Dr. Catlett was at the table.

It was generally conceded at the table that we should not take the risk of the health of our little patients by leaving infected teeth in the mouth. It was also felt that this step should be taken even though it was more or less impossible to retain that space by some mechanical means, and that if no mechanical apparatus could be successfully applied to hold the space, it was best to take the chance and leave it to the orthodontist to open the space afterward if the space collapsed.

The next question, how far the dentist should go in the removal of decay in the treatment of teeth where the pulp was not already exposed was discussed, and it was the consensus of opinion that sterilization of the cavity should be undertaken by whatever means he found most successful. Being an orthodontist and not having treated any of them for a great number of years, I am not qualified to state what that sterilization should consist of. However, sterilization should be made rather than take the chance of removing the decay and exposing the pulp, as in the majority of instances success is very doubtful.

The best part of the round table discussion cannot be expressed here because, as I said before, any of you who know Dr. Catlett, Dr. Barker, and Dr. O'Donald know we had some good fireworks.

**Table No. 14—**

Topic Leader.—Dr. Abram Hoffman, Chicago, Ill.

Table No. 14 was one of the overflow tables, and, under the conditions, we were without an assigned topic. While sitting here becoming acquainted, the observation was made that the host was the only person at the table who was a member of the Society; that the other eleven were guests of the Society. That at once suggested an interesting line of thought, and the result is presented at this time; a report that is slightly statistical in its nature but at the same time interesting.

The thought came: Why are these eleven men here? The response was about as might have been expected. First of all, they are here because of their interest in orthodontia.

The second response was that our programs have for so long contained such interesting papers that those interested in orthodontia cannot afford to miss the meetings.

The third reason was to see the clinics.

The fourth reason was that they desired to meet the men of this Society and the other good fellows who constitute the orthodontic profession of this country and Canada.

Last, because this year's meeting affords such an excellent opportunity to combine a profitable meeting with an enjoyable vacation trip.

In view of these things, the thought came to me: "What is the status of these men in practice? I find that one has devoted 60 per cent of his practice to orthodontia for fifteen years; another 60 per cent for two years; another 100 per cent for five years; another 100 per cent for one year; another 100 per cent for two years; another 100 per cent for fourteen years; another 100 per cent for five years; another 65 per cent for three years; another 100 per cent for three years; another 50 per cent for two years; another 100 per cent for five years; another 100 per cent for twenty-five years; or, as a total average, they have been giving in that period of years, 87 per cent of their time to the practice of orthodontia.

The next interesting point was that eight of the twelve are exclusive practitioners in orthodontia. If eight of twelve are exclusive practitioners, eliminating maybe one, why are not the other seven members of this organization? Possibly one or two of them have not put in the required "exclusive practice" time for membership, but we hope all of them are going to be with us in the very near future.

The next interesting thing is that these twelve men traveled approximately 31,400 miles to attend this meeting, or an average of 2,618 miles individually. Six of them came by auto and six by train.

These things suggested the further thought: How have these men obtained their instruction in orthodontia? I find that three of them are graduates of the "university of hard knocks"; in other words, they are men who have taken up the study and have become more or less exclusive practitioners because of their love for the work. Four of them are the result of association with older practitioners, and five of them are the result of a short course in orthodontia.

We carried on a discussion as to what they would like for future programs, and again, the answers were quite as we might expect. The first preference is for a continuation of the excellent literary programs. The only criticism offered was of a constructive nature, which I want to pass on to the Executive Committee and the Board of Censors, viz., that discussors of papers be very *carefully* picked and that we have more *set* discussions. That is interesting, coming as it does from a group of nonmembers.

For the second suggestion, they would be interested in seeing more clinics. We all expect this because so many men go to the dental meetings chiefly because of the clinics.

The third suggestion of interest is that we increase and enhance the manufacturers' and scientific exhibits.

The men all expressed their appreciation for the privilege of attending these meetings, and they all wish to attend just as often in the future as it is possible for them to do so. We who have been working in the interest of this Society are just as appreciative of their presence here as they are of the privilege of being here.

#### Table No. 15—

Topic Leader.—Dr. H. R. Robison, Hutchinson, Kansas.

We had really organized our table before Dr. Oliver came around. I think possibly the chief reason was that we had two California men with us and there was considerable fear that if we did not organize they would want to talk about California. We had therefore organized as a matter of protection.

We had a maverick table but its occupants were by no means unbranded, which was evidenced by their knowledge and interest in the subject, and from our discussion you would think we were a group of physicians in consultation because we were in perfect harmony.

I think I am a little bit in the position of Ole who was out riding with Hilda, and he said, "Hilda, will you marry me?"

"Yes, Ole."

He drove on a while without saying a word. Finally she said, "Ole, why don't you say something?"

Ole said, "I tank I said too much already."

That is how I came to get the position. I talked too much, and therefore I was elected chairman. Our subject was: What part does muscle function play in the correction of malocclusion, and how long should it be maintained? We were unanimous in the opinion that the first thing we should do is to educate ourselves to its need; next, that in most instances it should be employed as an aid rather than as a complete treatment. We also decided that it should be employed until we obtain a normal relation of the associated organs, and a normal function of the muscles.

We discussed at some length the question as to when this point would be obtained and how it should be determined. It was decided that would remain with the orthodontist, and then in some instances there was a possibility of a relapse due to a discontinued function, therefore it would be well to keep the patient under observation.

However, we were further agreed that after the muscles had become sufficiently normalized they were likely to continue their normal function and consequently retain the teeth in their proper position.

That one of the most important results obtained is producing normal breathing. We were all of the opinion that employing muscle functioning in the treatment of cases merits more consideration than the average practitioner gives it. As we saw it, the chief drawback was in obtaining the cooperation of the patient. We did not feel that it was entirely due to the patient but that probably the operator was just as much a fault as the patient himself.

## DEPARTMENT OF ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

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### PREOPERATIVE, OPERATIVE AND POSTOPERATIVE CARE IN EXODONTIA\*

By MORRIS A. ZIMMER, D.D.S., NEWARK, N. J.

*Instructor in Dentistry, Columbia University*

THE prevention of tooth decay—the goal set by the best minds of the profession—is still in the distant future. Until that ideal of dentistry arrives, we are much concerned with this problem. For convenience we must subdivide our dental problems as follows:

1. Elimination: removing from the mouth that which acts as a detriment to mouth and body health.
2. Conservation: to repair that which can be saved.
3. Restoration: to restore the mouth to as near normal as possible.

The first problem is the one with which this address is concerned, and that it is a very important one goes without saying. Upon the manner in which one single tooth is removed may hinge the well-being—yes, even the life of the patient. Therefore, whatever can be gleaned to help us in this important art—the art of exodontia—is of vital interest to all of us.

The first part of my title is preoperative care—the care and precaution that we take in preparing to operate on a patient. Here the personal factor enters. Some operators are not satisfied unless they follow the rigid technic used in a hospital operating room. But this procedure is too laborious and time consuming. A modification of this is suitable for routine office procedure. A hand brush, green soap, fresh running water, orange wood stick, bichloride solution, and a sterile towel are absolute essentials. This applies both to the operator and to the assisting nurses.

Instruments that have been sterilized must be placed in sterile containers. If a sterilized instrument is returned to the regular instrument cabinet,

\*Read before the Union County Dental Society at Elizabeth, N. J., March 7, 1929.



it is not sterile. Therefore, the use of a tray system is advisable. A small table can be used to hold these trays, and after the instruments are taken from the cabinet and sterilized, they are sorted and placed in these trays. When any are needed they are moved by instrument forceps. In this way all the instruments necessary for the day's work are sterilized at one time each day, and then again after each use.

Now we go one step farther with the tray system. It would be a great expense to cover the instrument table with sterile towels and continue to change them each time they become contaminated. Even then the towels would not be sterile, as they would be covering an unsterile table. Therefore we again use trays. The trays are scrubbed carefully, boiled if possible, if not they can be thrown into a strong bichloride solution and kept there until ready for use. The trays are made of enamel; a strong solution of bichloride will not harm them, they will be absolutely sterile and always ready for use; ten are in the solution, and the tray just scrubbed is placed at the bottom. A white enamel container holds the solution and trays. The trays measure approximately  $5 \times 8$  inches and are large enough for all sizes of instruments.

The old-fashioned method of picking up some cotton and swabbing the wound with it is as obsolete in exodontia as the horse car in transportation; sterile sponges must be used. (Septic cotton used in a tooth socket means sepsis in contact with the blood stream, and dire results may follow.) Cotton applicators are a necessary part of our armamentarium, but these must first have undergone rigid sterilization.

Sterile sponges should be made by the assistant, placed in a canvas bag containing several hundred and sterilized in an autoclave sterilizer. A small autoclave sterilizer is an absolute necessity in a dental office where exodontia is practiced. Until this apparatus can be purchased, it might be feasible to have the sponges sterilized at one of the hospitals.

The towel placed on a patient for the extraction of teeth or in postoperative care must receive more attention than for other dental work. It must be so placed that any irrigation in the mouth should not find its way on the patient's stiff collar or new dress. This can be accomplished by placing the towel close around the neck and engaging the two tightly approximated ends with a towel clip.

So much for a careful and yet simple technic for the preparation of the patient as well as the instrumentarium. Our next step is that of anesthesia.

#### ANESTHESIA

Poor anesthesia is a synonym for poor exodontia. One cannot do good, skillful, careful operating with a patient twisting and squirming under a partial anesthesia, or howling and screaming as a result of no anesthesia. Although the operator may feel that the patient ought to have a good anesthesia, if the patient winces and squirms, stop and reinject. Very seldom does a patient lie about his being hurt, and if he does, it is better to inject another c.c. of procaine solution than chance hurting him.

An important precaution that one must not slight is that of being sure to operate only under proper light. By this I mean two things: (1) a proper

source of external light played upon the field of operation so as to eliminate any obstruction to the surrounding tissues, (2) the elimination of any exudates that are oozing into the field of operation. This should be accomplished by constant sponging. At this point it is paramount for the operator, in spite of any emergency, not to become panicky. If a root is broken, it is a wiser procedure to pause several times to permit your assistant to sponge the field, rather than to make frantic efforts for hasty removal. A proper anesthesia will permit ample time for slow, careful work, and repeated sponging will assure you greater facility in operation with less damage to surrounding tissues.

#### SUPPLEMENTARY INSTRUMENTS

The choice of forceps is individual. But there are certain supplementary instruments that are vital for the practice of exodontia. I shall explain their merits and show why they are indispensable.

To begin with, the use of the mouth mirror and college pliers for routine examination is not sufficient. The operator develops the tooth habit and ignores the mouth in its entirety. Therefore the first instrument of importance is the cheek retractor. It is indispensable in order to get a real view of the teeth, the gums, the tongue, the tonsils, any abnormality or any sign of pathology. The type I use is made of German silver. It is annealed in the flame and bent to engage the cheek in the form of a half circle.

The next instrument is the gauze pack. The gauze pack or gauze director is very necessary in the hands of every dentist, and its use should be learned very carefully. We should be able to feel with it. Inserting a dressing into a wound is an art. It can be done very painfully or almost painlessly depending upon the care and skill of the operator. Another excellent use of the gauze pack is to cleanse large sockets or bone cavities with an open sponge using the twist motion.

Next we have the serrated forceps. This is essential where gauze of any kind is being used or where suturing is done. The serrations prevent the slipping of the article picked up.

We then have the blunt silver probe with a smooth rounded end. This is indispensable for the examination of suspicious sockets in both maxillae, also for probing into a fistula, a necrotic area, or for testing the depth of a wound during its healing.

These four instruments constitute an examination tray. Every dental assistant should be instructed in the preparation of this tray, which with two cotton applicators and two sponges is now complete.

To change this to a dressing tray, all that is needed is to add a metal irrigating syringe and nozzle, and the dressing gauze with scissors.

To prepare an anesthesia tray, add your charged syringes and medicate one of the applicators.

In a companion tray, you place the following: your favorite forceps, elevators, straight or angle curettes, file and bone forceps.

In a third tray place a pair of scissors, scalpel, periosteal elevator, one needle with suture, and a needle holder, all ready for use in case of emergency.

This last tray is covered; it may not be used for the entire day, but if it is necessary, you have it ready.

My reason for making this the minimum of armamentarium is a very evident one. None of us knows when a tooth will break, so why not prepare each tray for the removal of a root? It seems like quite a job, but suppose you use them only once in ten times? Having the instruments before you acquaints you with their use and improves your dexterity to such an extent that you will find your technic will develop amazingly. Remember that boiling instruments does not take any of your own time, and when they are needed, they save time, labor and embarrassment.

I shall not dwell upon syringes and anesthetics. Syringes are best kept in an alcohol glycerine solution. The needle is sterilized before each injection, while the syringe barrel is washed in sterile, distilled water before loading.

The Metz Procaine Tablet T rather than Tablet E is now being used extensively for routine work. For the men who wish to make absolutely sure of their technic, the tablet form and individual preparation of the procaine solution is the best method.

We presume that the area has been injected. Dry the tooth to be removed with a sterile sponge held in your serrated pliers. Paint the tooth and surrounding area with argyrol 25 per cent and wipe again. If the tooth is covered with heavy tartar deposits, remove them first, so as not to give these deposits a chance to break away during the extraction and find a fine resting place at the bottom of the socket.

Now we are ready to extract. I am reminded of the old adage: "The longest way round is the shortest way home." Every man extracts teeth a little differently, but certain practical uniform suggestions will be of use to the majority. We all break teeth. To prevent the breaking of the apex of the tooth unnecessarily during extraction is our aim all the time. Certain rules will help.

1. Do not rush—make haste slowly, for though the patient is nervous and is anxious to get it over with, still the slower the manipulation, the speedier the result.

2. Use psychology. Talk to the patient quietly. Giving him confidence helps a great deal.

3. Have your x-ray film so placed that you can see it clearly from your operating position. If you have no wall shadow box, fasten the film holder to window pane with adhesive tape.

4. Visualize position of root or roots by aid of the x-ray film, also other peculiarities.

5. Use a narrow tapering elevator similar to the Hugh Friedy 40, and insinuate it under the mucoperiosteum. Go up a half centimeter if you can, and pass this instrument around the entire tooth, disengaging the tissue from the tooth. By accomplishing this result you effect the following:

- (1) You are testing the anesthesia.

- (2) You are preventing the tissue from tearing.

- (3) You are aiding in getting a good high purchase on the tooth to be removed.

There are four steps that must now be remembered:

1. Insert beaks of forceps parallel to the roots.
2. Climb as high as possible.
3. Close tightly.
4. Slow manipulation—and in the form of an arc.

The last point, that is, slow manipulation in the form of an arc, deserves a few words here. This point refers especially to the removal of all maxillary teeth. For example, as you begin your buccal motion in removing a maxillary first molar, it is necessary for your wrist to make an arc, by so doing you ease the roots out of their sockets, naturally and anatomically.

Dr. Henry Sage Dunning calls the tooth socket the birth canal of the tooth. You must, by properly adjusted pressure, loosen the tooth out of this birth canal, and since the upper maxillary arch is curved, you continue this curve to make the letter U.

There is no such thing as removing all teeth in a buccal direction. When there are malposed teeth or badly curved roots, the birth canal will help decide the direction best suited for removal. We must always bear in mind that extracting teeth is really a dissection.

If after applying the beaks of the forceps it is found that the tooth will not budge, a good method is to use a hand chisel, insinuating it between the tooth and the buccal plate, and with a firm rotating motion, force it along the root axis.

This will shell away enough bone so as to simplify entirely the extraction. The mallet and chisel can be used instead of the hand chisel, but no bur, unless the gum tissue is laid back, as the mucoperiosteum would be injured.

Now let us presume that all care has been taken, and still we have fractured the apices of the following teeth:

1. Apex of the buccal root of maxillary first premolar;
2. Apex of the disto-buccal root of maxillary second molar;
3. Both apices of the mandibular left first molar;
4. A curved distal root of the mandibular right third molar.

I choose these four locations to bring out different technics applicable.

1. The first premolar root may not be directly under the maxillary sinus. The radiograph is the deciding factor. If it is not, and pressure can be used, use a narrow pick elevator, similar to Hugh Friedy pick No. 1. This is very narrow and can be wedged between the root and the wall of the socket until the apex will pop out. If necessary, a spear drill can be used to create a tiny space between the tooth and the wall of the socket to allow insertion of this pick. However, if the x-ray shows that the apex is directly under the sinus, then the removal of the buccal plate is the only rational method. It is speedy, simple and good surgery.

An incision is begun from the mesio-interproximal papilla of the tooth, and as the cut extends up, it is sloped distally until you reach the mucobuccal fold. At this point you are directly above the disto-interproximal papilla; push back the tissue with a periosteal elevator, and with a narrow bone forceps bite out as much of the buccal plate as you can, until the root is exposed. If the plate of bone is too narrow to be cut by the bone forceps,



use a narrow chisel directed from the mesial or distal side, tapping gently; the bone is very thin and can be removed with a few taps.

Please notice that no upward pressure has been exerted, for the apex may be only 1 mm. from the antrum floor or may even be dipping into the antrum. Right here the open sponge gently rotated into the socket by means of the gauze pack is a wonderful aid.

In the second molar area, before the flap is made, the advisability of removing the septa between the roots is considered. Invariably this can be done and the roots lifted out with a curette. In the mandible the use of a small hand chisel for the removal of the septum between the roots very often eases the way for the insertion of a Crier elevator and lifting out of the roots. If this cannot be done, then the flap operation is advised. In the mandibular molar areas I find it best to make two incisions, each one beginning from the interproximal papilla and extending down at an angle of 30 degrees. The flap is pushed back (make sure the periosteum is brought back with it), and the buccal plate is removed.

Too much caution and timidity will mean more laceration. Pushing back the tissue without incising should be frowned upon. Do not hesitate to incise and get it over with at once. A clean incision heals speedily, while bruised tissue takes weeks to heal.

Now let us consider the removal of the curved distal root of the mandibular left third molar. The buccal plate is heavy, and the best procedure is to remove enough of the septum to enlarge the socket so that a narrow elevator can be inserted and root lifted out. Very often you will find that the inserting of your Crane pick into the mesial socket with pressure applied distally will spring out this root very simply.

In the fracture of anterior roots, also mandibular premolars, where pressure can be used with no untoward result, the narrow Hugh Friedy elevators Nos. 3 and 4 are excellent. They are wedged between the process and the root and rotated slightly. The concave side of this elevator rests against the tooth. If the tooth has a taper, it will be lifted readily; if it has a bulbous end, elevation is impossible and the buccal plate must be removed.

Always remember that it is advisable to compress the sockets after each extraction—to bring back the plates which have given a bit during extraction, because not only do you bring the plates of bone back to normal but the open wound is made smaller and will heal more quickly.

I want now to stress the procedure necessary after a simple extraction. It is true that removing the tooth is the essential factor, but it is not enough. Care must be taken not to leave a knife-like edge of buccal or lingual plate of bone. Careful finger palpation and smoothing of the alveolar process are essential parts of the operation, as some bone, especially the buccal plate, is invariably fractured in the removal of dead teeth.

Our purpose can be accomplished by the use of three important instruments: (1) a sharp curette; (2) a bone forceps; (3) a bone file.

If the curette is not sharp, it burnishes the bone. The bone forceps or rongeurs must be used very carefully and sparingly. Just the sharp points are to be snipped off with this. We must bear in mind that the septum be-

tween the sockets forms the ridge, and we must be very chary about removing any more of this than we need to. The file is a conservative, thorough and careful instrument when used properly. Accessive filing promotes bur-nishing. A few quick, sure strokes are enough.

After the socket has been cleansed and smoothed, it must receive the eye test. A tiny but powerful light is used to visualize the entire socket. A bit of carelessness of this type caused me a great deal of trouble several years ago.

A patient presented for the removal of the first and second mandibular left molars, both of which showed large uncircumscribed areas of bone degeneration at and beyond their apices.

I laid back a flap, removed the teeth and enough of the buccal plate to visualize the infected area. The teeth had contained large leaky amalgam fillings. The case seemed to heal properly and I looked for an uneventful recovery. I removed the sutures in five days and dressed the wound for about three weeks. The wound had now become filled with granulation tissue and was quite shallow; consequently the patient was dismissed.

About two months later the patient returned and complained of pain and swelling in that same area. When I again examined it, I found the gum tissue inflamed and puffy, with marked tenderness on palpation. I was puzzled and took new radiographs, and to my great chagrin, I discovered a piece of metal, most likely amalgam, in the apparently healed cavity. The disclosing of this little piece of metal was an exceedingly trying procedure, as it had completely encysted itself in the soft tissue. One experience of this kind was enough, and now I am more than careful to prevent a recurrence of such an accident.

We will assume that we have removed the six anterior teeth of the maxilla. Two were removed with the pericementomas intact. Must we curette? By all means—NO.

Two teeth were vital. Then there is nothing to curette, unless the x-ray film showed a lateral abscess.

The other two teeth showed an indistinct radiolucent apical area. Here curettage is absolutely indicated. The sides of the curette must be as sharp as a knife. We want to cut apical soft tissue, not healthy bone, and the pressure should be very gentle. Remember our purpose is to cut the infected soft tissue from bone not to gouge the bone.

Where the pericementomas or even a thickened peridental membrane is allowed to remain, we give this infected tissue a chance to grow and spread. If it contains a strain of epithelial cells, our infection is prone to develop into a cystic area. This degenerative process can continue for a number of years without the knowledge of the patient, to the detriment of his general health and at the expense of his jawbone. It is therefore very essential to remove all the apical contents of the tooth socket. There are places where it is impossible to remove the infected tissue through the narrow socket opening. Here the operator is helpless, unless a flap is made, especially if the area is beyond the apex of one of the narrow rooted teeth, as for instance the mandibular centrals, laterals, or premolars.

In the molar area of both the mandible and maxillae, it is often possible

to remove all the septum and make the opening large enough to shell out the tissue that has undergone cystic degeneration.

Blind curettage is always dangerous, the operator must at all times see what he is doing.

TECHNIC.—1. Make two incision flaps.

2. Lay back tissue beyond the apex.

3. Note apical region. Has it penetrated the buccal plate?

4. If so, make small window here.

5. If not, make complete opening from neck of tooth, and large enough to visualize the site of infection.

After the infected tissue has been thoroughly removed, we are presented with this problem. If we have removed the dental granulomas in order to clear up an oral focus of infection, are we entirely certain we have eliminated the bacteria from that area?

Dr. Rosenow of The Mayo Clinic says, no, not until we have used a powerful germicide. He advocates the use of phenol immediately followed by alcohol, carried to the apex of the socket on a pellet of cotton in long narrow college pliers. By this method all bacteria still in the area are completely destroyed without any harm to the tissue.

#### INCISION FLAPS

In making a one-line incision, never make the incision at the spot where bone is to be removed but mesial or distal to it, so that the tissue to be sutured *rests on bone*. In suturing tissue for closing a wound, first run the suture needle through the tissue that is attached to and covers firm bone, then by use of the mouse-tooth forceps, the flap is held firmly and perforated by the needle. While on the subject of incisions, please remember that in making an incision for the evacuation of pus, in case of a dental alveolar abscess, direct your knife toward bone. When the opening has been made and drainage effected, carry your dressing to the bone, for always remember that in our field, the abscess always begins its foundations in the bone.

A mouse-tooth forceps is indispensable for holding tissue for suturing. A surgical knot is first an ordinary knot looped twice instead of once, and when once tightened it will not open. Two simple knots are added before the suture is cut.

#### PRINCIPLE OF SUTURING

Sutures must not be made too tight, for if they are, you cause either a pressure necrosis or muscular action which will tear the tissue open. The needle must engage enough tissue or the sutures will tear through. In the mouth 2 mm. of tissue on each side of the incision is enough for buccal soft tissue. When palatal tissue is sutured, a bit more tissue must be utilized. An excellent suture material is dermal suture. This comes in three thicknesses.

#### BROKEN MAXILLARY TUBEROSITY

If, in removing the third molar, part of the tuberosity fractures away, remove it at once. If you do not, it will become a bone sequestrum, causing untold agony to the patient. Then suture the wound securely. If there is too

much tissue trim away the surplus after you have approximated both ends and noted how much to trim. By trimming away the excess tissue, you prevent the creation of a water bag effect, and the soft tissue will rest properly on firm bone.

Where several adjoining teeth are removed, perform a miniature alveolectomy. We all know how important is a good hard and smooth ridge for restorative work. Any sharp edge, groove, point or prominence will be a reason for failure in our prosthesis. It is, therefore, essential to anticipate the result desired and to trim the bone accordingly. If you have occasion to remove quite a bit of bone, cut away the excess soft tissue, otherwise it will roll in a sort of double chin effect. Here you make use of your finger for finding the sharp uneven spots, and the instruments essential for this operation are the bone rongeur, a sharp curette, and a boné file. When the bone has been made smooth, and the soft tissue properly approximated, suture tightly; the wound will heal by first intention with little or no hemorrhage. Invariably, in alveolectomy, the area will bleed very profusely during the operation, but the moment the soft tissues are sutured, the bleeding will be checked at once.

#### PERICORONAL INFECTION

A highly precarious type of case to treat is that of a mandibular third molar with a very severe trismus brought on by an acute inflammation of the gum and muscle tissue near and surrounding the tooth. Conservatism here is absolutely necessary. It is very easy to force a purulent active infection into the ramus, the cheek and the neck, and to change a local inflammation to a markedly diffused cellulitis.

Where pus is found, the insertion of a drain and, if necessary, a small incision with dressing for its evacuation is the ideal method of treatment until the trismus has subsided. The removal of the tooth then becomes uneventful.

Dr. Theodore Blum reported a case wherein a death was due to cavernous sinus thrombosis brought on apparently by the too speedy surgical removal of a mandibular third molar with a pericoronitis. Dr. Henry Sage Dunning recently related a case of Ludwig's angina that had been referred to him, wherein a mandibular third molar, partially impacted, with a very slight trismus brought about this fatal malady and death. These may be rare occurrences, yet to my mind, an osteomyelitis may easily follow the too speedy removal of a mandibular third molar with a marked trismus.

Up to this point we have discussed the preoperative and operative care in exodontia. We now have for consideration the question of dressing of wounds and the postoperative care of sockets.

When the tooth socket has been thoroughly cleansed, smoothed and inspected, we are ready for dressing. We must remember that we dress wounds for the following reasons:

1. To prevent hemorrhage;
2. To prevent ingress of food or foreign substances;
3. To serve as a sedative or a carrier for one;



4. To serve as a stimulant;
5. To be used as a drain;
6. To prevent a too rapid closure of the wound.

But when to and when not to dress depends entirely upon the judgment of the operator. First, the patient is always asked if he bleeds much on cutting himself. If he does not recall, it is a good indication that he has had no untoward experiences. Certain rules can then be made.

I use no dressing: (1) if the tooth was vital before removal and no undue trauma was occasioned in removing it; (2) if the socket is narrow or shallow; (3) if the granuloma was attached to the root apex on removal; (4) if the teeth were markedly loose and the sockets very shallow.

I use a dressing: (1) if a wound is large enough for the insertion of over one inch of  $\frac{1}{2}$  inch width gauze; (2) if any extensive curettage was done; (3) if bone was removed to release the tooth, thereby enlarging the original size of the socket; (4) in acute conditions it is always essential for drainage.

Years ago, upon the suggestion of Dr. Adolph Berger of New York City, I impregnated my bottles of iodoform gauze with thymol iodide and allowed them to stand for at least a month before using. The gauze so prepared has not as pungent an odor, is sedative and more stimulating. If a drop of vaseline is smeared on the first third of the gauze as a lubricant, we have an ideal dressing that can be inserted and removed painlessly.

In a large bone cavity, where we have shelled out a cyst, surgically removed hypercementosed roots, or an impacted tooth, a dusting of thymol iodide in the wound works wonders. This powder stimulates the wound, protects it and helps prevent hemorrhage.

Wounds should be dressed and not packed. The only time when a socket is actually packed is in case of a profusely bleeding wound, or where a patient relates a bad experience of hemorrhage after a previous extraction.

The gauze director should always carry the dressing to the farthest point of the socket in a straight line.

I shall include in this last topic of my address a special treatment of the dry socket. There is little in our dental literature wherein this condition is described, and there are no definite rules given for treatment.

Regardless of the best of care there will be a certain number of post-operative cases that develop what is called a dry socket. The word is a misnomer. There are in reality two types for us to deal with—the dry socket and the sloughing socket. These two types differ essentially in their original cause, appearance, discomfort to the patient, and treatment. We must consequently learn to differentiate between them.

In the dry socket type, the granulation is very slow, the surface epithelializes too quickly, dips down and practically obliterates the cavity. When this occurs, granulation stops. In other words we have a race between two types of growing tissue wherein the epithelium wins.

The socket is dry, shiny and painless. The healing remains at a standstill until the granulation tissue is freed from its invader. Of the two types, this is the one that is less frequently met with.

In the treatment, our object is to remove the superabundant epithelium. We excise this with a very narrow scalpel, and a sharp, shallow curette. Care must be taken not to curette deeply or excessively, as the socket, harboring infection, may become the beginning of a suppurative osteitis and subsequent necrosis. After the removal of the overlying epithelial tissue the socket is irrigated and dressed with iodoform gauze. The socket will then heal uneventfully.

The second type of socket which is in reality a moist sloughing socket is the one that we most frequently encounter, and that gives us the most trouble. The patient gives a history of suffering excruciating pain, the socket is filled with a gray tissue detritus, has a fetid odor, the surrounding gum tissue presents red inflamed edges. Even irrigation is extremely painful unless very gently done, and the patient will often remark that there is a twinge of pain in the socket with every heartbeat. The true name is the necrotic socket, for there is actually a necrosis of the alveolus.

The causes of this condition are many: excessive trauma; pressure used during infiltration of novocaine; pre-existing osteitis; hypercementosed roots wherein force is used to remove them, causing a burnishing of the bone; introducing a septic infection by foreign contamination; and too tight packing of the socket.

However, the fault may not lie with the operator, as this condition can be brought about by poor resistance of the host, diabetes, lues, or one of the anemias. It is, therefore, extremely important to question the patient thoroughly before instituting treatment, as infected sockets of this kind will not heal until systemic treatment has been begun.

The problem presented by a necrotic socket is very different from that of the dry shiny socket described above. Here we have a thin layer of dead bone. The new healthy granulation tissue, containing its own fresh blood supply tries to grow, but cannot because the active sloughing steeples the fresh young tissue with a purulent discharge. This sloughing process causes the invaginating of the young tissue with destructive bacteria and aborts its growth.

The sloughing bone may take one of the following courses: If it is very thin, it may absorb as the new granulation creeps in. If the bone is very thick, a true necrosis sets in and the entire socket exfoliates en masse.

The treatment of this type is entirely palliative. Our purpose is first to arrest the necrotic action and then to promote healing. To accomplish our first aim we must use a caustic or escharotic. The escharotic causes death of the bacteria in the socket and likewise of the superficial bone tissue. When this tissue is thus destroyed it forms a protection to the underlying tissue which is made up of fresh granulations. This new tissue can now develop and throw off the dead tissue.

For this purpose there are two drugs that I have found very effective: (1) trichloroacetic acid mixed with thymol and menthol crystals, and (2) aromatic sulphuric acid.

To make the first preparation, place ten drops of the liquid acid in a Dappen cup. Add equal parts of thymol and menthol crystals until you have a heavy, saturated solution, not a paste.

Irrigate the socket gently with warm saline solution, and dry the socket with sterile sponges. Block entire area with sterile cotton rolls. Now dip a pellet of cotton into the acid, carry into the socket with long narrow college pliers, and swab the socket for ten seconds. Remove and fill the socket with powdered perborate of soda. Allow to remain for one minute. Then remove cotton rolls, irrigate with weak  $\text{KMnO}_4$  solution, again dry the socket, and you are ready for dressing.

Aromatic sulphuric acid although not as escharotic is just as excellent. This drug is ready for use without previous preparation. It is applied in similar manner and is immediately followed by alcohol. All other steps are the same as mentioned above.

The dressing of this type of socket needs special attention. In our office we use aristol iodoform gauze. This gauze is prepared by placing thymol iodide (aristol) at the bottom of a new bottle of iodoform gauze and shaking well every few days, and allowing to stand for at least a month.

We now add a paste to serve as a sedative and lubricant. This is made by mixing white vaseline with novocaine powder and aristol. This paste is smeared on the first half of the gauze and is carried into the socket. A sterile sponge is placed over the socket, and the patient is instructed to bite and retain for fifteen minutes. This treatment, if carried out minutely, will give the patient great comfort.

There are a few suggestions that can be used to help prevent dry sockets and sloughing sockets.

1. Where nonvital teeth are removed, touch the apex of the socket with phenol 95 per cent, followed immediately by alcohol. (This technic is advocated by Dr. Edward C. Rosenow.)

2. The use of a sedative an hour before and an hour after extraction of teeth is ten times as effective as after severe pain begins.

3. Give every socket the finger test, making sure that all spicules are eliminated.

4. Insert iodoform gauze with a gauze director, and use no pressure.

5. The use of aristol keeps the wound clean, healthy and free from odor.

Hence we see that the most important factor is the ability to recognize the type of socket we are dealing with. If the socket is dry, shiny, and epithelialized, surgical intervention is necessary. However, if the case presents a sloughing necrotic socket, only palliative methods are indicated, otherwise you can stir up an osteomyelitis and subsequent necrosis.

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## REPORT OF MULTILOCLAR CYST IN THE LEFT MANDIBULAR REGION

BY CHARLES W. LINCOLN, D.D.S., PASADENA, CALIF.

PATIENT, male, age twenty-eight years, weight 163 lbs., presented himself on March 25, 1928, and gave the following history. He had been under the care of a physician for the past three years with gastric disturbances. Plans had been made for an operation for the gastric ulcer on three occasions, but each time the diagnosis was changed to acute indigestion.

His immediate complaint was a slight soreness around the left mandibular first and second premolars and the second molar. There was no apparent swelling present. I found upon palpation that these teeth were quite loose, and the buccal wall of the mandible was fairly flexible to pressure. Upon radiographic examination I found the condition shown in Figs. 1, 2, and 3.



Fig. 1.

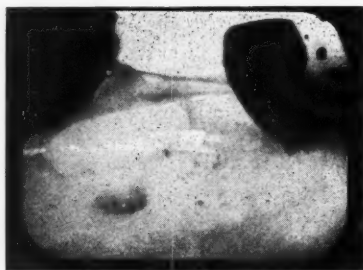


Fig. 2.

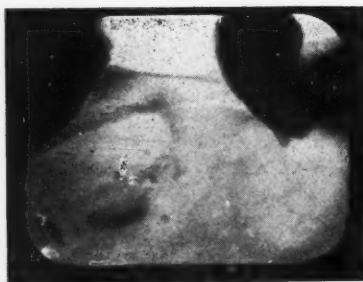


Fig. 3.

Fig. 1 shows an apparent absence of bone on the buccal plate between the second premolar and the second molar. A bridge had been in place with a gold crown on each abutment tooth. The patient informed me that he had had much pain until the pulps evidently died, then no pain in the region whatsoever. Fig. 2 shows somewhat of a calcified area in the floor of the cyst. Fig. 3 shows a slight amount of bone around the gingival two-thirds of the root of the tooth but the apex of the roots within the cystic cavity. These three teeth did not respond to the electrical pulp test. They were removed; a considerable resorption had taken place on all the roots. A buccal flap was laid back presenting a white fibrous sack lining the cystic cavity. This cavity was filled with a greenish, curdy, liquid mass. Fig. 4 shows condition immediately after extraction of teeth and the cystic fluid removed.

Fig. 5 shows the condition two months later; the wound was considerably filled in from the bottom. Four months after the operation the wound was about one-half inch deep and was entirely covered with mucous membrane.

That was the last I heard; the patient has left the city.





Fig. 4.



Fig. 5.

## REPAIR OF DEFECTS CAUSED BY SURGERY AND RADIUM IN CANCERS OF THE HAND, MOUTH AND CHEEK\*

BY V. P. BLAIR, M.D., ST. LOUIS, MO.

**F**OLLOWING a loss of tissue from a heat burn, a surgical removal, or a mechanical injury, a more or less acceptable repair can be made by first removing the scar or, with proper precautions, the granulations down to normal tissues, and then filling the defect with the most appropriate available tissue. According to circumstances the latter might be obtained by sliding in the neighboring structures, by pedicle flaps, or by free skin grafts. If skin grafts are used, their thickness will usually depend upon whether the derma or only the epithelium has been lost.

In planning the repair, not only must we consider appearances and function of the area repaired, but also that from which the repair material will be taken, and too often in large restorations one's ideas will be pinched by necessity of "cutting the pattern according to the cloth." As nearly as possible we should replace lost epithelium, derma, subcutaneous fat, tendons and resisting fascia with like tissues. Transplants of cartilage, bone and possibly motor nerves, may, at times, be indicated. Non-hair-bearing skin is a good substitute for the oral and pharyngeal mucosa.

Exactly the same rules hold true for restoring areas destroyed or damaged by exposure to roentgen rays or radium, but in practice an added difficulty may arise in these radiation burns and some chemical burns. Within a few weeks after a heat burn and of most mechanical injuries the plane of limit between the devitalized and the nondamaged tissue has become sharply defined, and it is only when an immediate débridement and repair is attempted that there may be any difficulty in recognizing the demarcation. This is not true with radiation burns, and in débridement of the latter months afterward one may have difficulty in determining whether he is making unnecessary sacrifices or is leaving tissue of doubtful vitality. This, in conjunction with our natural conservatism, will explain why attempts at repair after radiation burns have given a higher percentage of failures than after any other type of injury. Old radiation burns that have been scarred over for several years are not especially bothersome in this respect. Real difficulties might be encountered in attempting to clean up indolent, raw or painful burnt areas that persist in spite of all forms of treatment and neither heal nor make a frank slough. With these latter it is better, when practicable, to remove too much rather than too little, just as in amputating for any endarteritis obliterans; and, if immediate repair is made, it should be with tissue of a vitality that can, in healing energy, easily compensate for a

\*Read at the eleventh annual meeting, American Radium Society, Dallas, Texas, April 19, 20, 1926.

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possible poverty in the tissue upon which it is to be engrafted. For this reason pedicle or sliding flaps are preferable to free skin grafts if there is any doubt of the condition of arterioles in the field to be grafted, and for such cases pedicle flaps should be used only with delayed transfer. It is probably good practice to delay their transfer very much longer than is necessary for repairs after simpler injuries. A delay of six to eight weeks before making the transfer of tissues from an irradiated area for a radiation burn is better practice than that of two or three weeks that is ordinarily allowed on other repairs. With some of these indolent burns, tissue might be conserved and risk of nonunion reduced to the minimum by proving the vitality of the base of the defect before transferring the flaps. This can be done by making a débridement with knife or cautery down to apparently healthy tissue and then waiting for granulations to form or immediately covering the raw surface with large Thiersch grafts. If from indolence of the base the granulations are poor or the grafts fail to take, little will have been lost, and the débridement can be carried deeper. On the other hand, if the grafts do survive, or healthy granulations develop, it is fair proof that a more formal repair can, in all likelihood, be successfully carried out. There can at least be some questioning in these radium burns as to the best manner of dealing with exposed necrotic bone that is still attached. As a rule, it is not good practice to attempt to excise a dead part of a bone before it separates naturally. On the other hand, bone killed by radiation separates very slowly. The application of a soldering iron to kill the indolent area and multiple drilling may hurry the exfoliation.

Carcinomatous changes in the irradiated tissues may further complicate the problem. The simple superficial epitheliomata will not, as a rule, require excision deeper than the subcutaneous fascia and can be immediately repaired. In dealing with these it is usually better to include in the excision the whole area of damaged skin and immediately replace it with a pocket flap or with a free skin graft rather than, as has been the common custom, to make a number of small local excisions and Thiersch graft. There are old roentgenologists who have had a great number of these limited operations on the hands and who still carry much skin that is potentially cancerous when the whole damaged areas might have been cleared up by a few well planned operations. The neglected epitheliomata and the carcinomata will demand the same excisions or amputations with corresponding glandular excisions, as will similar cancers arising from any other cause.

Whether it is for the treatment of a radiation burn, a cancer, or a distorting scar, the consciousness of ability to make an acceptable repair is the greatest stimulant to effective timesaving radical excisions.

#### DISCUSSION

*Dr. Douglas Quick, New York City.*—Dr. Blair has brought out a number of points. He has shown us what can be done by way of repairing many of the resulting legitimate scars following irradiation. He has also shown us some of the scars that are presented for repair which, in my judgment, should never have existed. In the nose case where the boy was treated with a little radium, and then more, and then a lot, for instance; that is one of the cases that goes down as a radium failure. Radium is damned for what happened

to the boy, whereas it should be the fellow who used the radium. I think our experience has rather borne out Dr. Blair's finding regarding the viability of flaps in irradiated tissue. We have had a good deal of difficulty in making repairs unless we have gotten well away from the irradiated area. I think some of the cases he showed us, the extensive growths removed with soldering irons and so on, were remarkable, but I cannot help wondering if the end justified such a procedure—whether more radiation and less cautery, in the beginning, would not have been worth considering.

*Dr. Robert B. Greenough, Boston.*—Dr. Blair has referred to the widespread effect upon tissues which have been under long continued irradiation, and we may easily believe that a large part of the good effect of radiation, either roentgen rays or radium, is brought about by the dense scar tissue formation in the surrounding tissues. In this way we attempt to strangle the living cancer cells by building up a barrier about the tumor.

*Dr. Curtis F. Burnam, Baltimore.*—Dr. Blair's demonstration of what can be done in expert hands in the way of plastic surgery is very stimulating, and I believe he is justified in his view that one can, in the exceptional case, irradiate to destruction with the possibility of subsequent plastic repairs. However, I join Dr. Quick in the opinion that in several of the skin cases, particularly the angiomas, the terrible scarrings shown should never have occurred; it simply means that brutal and unnecessary irradiation methods were employed. The amount of irradiation necessary to cure such conditions does not involve the possibility of serious injuries to the skin, and, indeed, in most cases these lesions disappear without the slightest demonstrable effect on any of the normal tissues. I emphasize this point because some of my surgical associates have been horrified at the thought of the use of radium in angiomas around the face and mouth, particularly in children, and have been willing to submit them to operations that are no beautifiers even in such skillful hands as Dr. Blair's.

*Dr. Blair (closing).*—In presenting this subject it was necessary at least to touch on treatment. While listening to this discussion I counted up the number of people on my list on whom we had burnt out a carcinoma with heat after they had been treated elsewhere with radium and found there were 10 such cases. These radium burns are at times unavoidable when attempting to cure extensive cancer. We have seen a number that had a hole completely through the cheek, but for that grade of cancer this may be good treatment. In repairing a heat burn, using the delayed flap transfer method, we have delayed the transfer for two or three weeks, but I think in a radium or roentgen burn it is well to delay it for six weeks or longer.



## A DENTIGEROUS CYST

BY A. J. SCHWARTZ, D.D.S., NEW YORK, N. Y.

**P**ATIENT presented herself with the condition as shown in the x-rays, Figs. 1 and 2.

Pain is rare in conditions of cystic degeneration in itself, but increase in size of the cysts and pressure upon adjacent nerve structures may produce pain.



Fig. 1.



Fig. 2.

Pain was not the reason for the examination. The adjacent devitalized teeth were the source of scrutiny, and it was considered advisable to obliterate this condition at the time of the removal of the approximating infected teeth. This type of dentigerous cyst is relatively rare and for that reason is interest-

ing. The primary malposed tooth was the superior right lateral approximating the maxillary sinus.

The usual mucoperiosteal flap was made, exposing a very thin outer plate of bone overlying the cyst wall. The denticles were firmly wedged together in one firm mass, and the removal of each one virtually presented a difficult extraction. Eighteen denticles were removed, varying from a fully formed crown and root to a crown with an incompletely calcified root. The removal

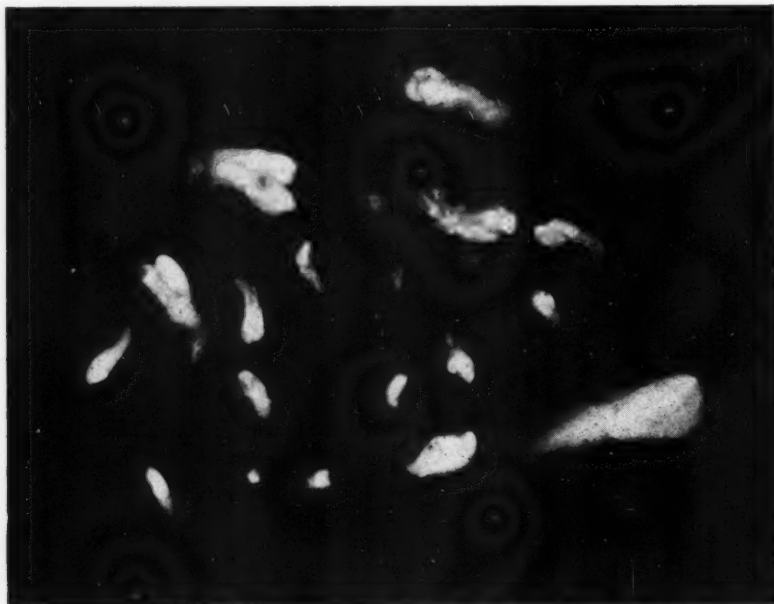


Fig. 3.

of the tumor mass and malposed tooth fortunately did not necessitate the exposure of the maxillary sinus.

These cysts usually occur at the time of secondary dentition, and almost any tooth may be involved in the formation of them. The etiologic factors of a dentigerous cyst may be attributed to a misplaced tooth anlage and to a malposed or unerupted tooth acting as a foreign body.

A plastic operation bringing the flap into such relationship as would prevent a depression in the alveolar ridge was subsequently necessary.

Fig. 3 shows the impacted lateral and the remaining denticles in various stages of development.

# DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Edited By  
Clarence O. Simpson, M.D., D.D.S., F.A.C.D.,  
and Howard R. Raper, D.D.S., F.A.C.D.

## EXAMPLES OF MISINTERPRETATION REGARDING SUPERNUMERARY TEETH

BY DR. CLARENCE O. SIMPSON, ST. LOUIS, MO.

THE FOLLOWING illustrations are reproductions of radiographs which were submitted for interpretation. In each instance, the perplexity was regarding one or more supernumerary teeth, and the evidence had been misinterpreted. When the interpretation is confusing, the importance of the unsettled question is often exaggerated by the suspicion that it may have a serious effect upon the patient. In addition to discussing the features about which inquiry was made, attention is called to the technical errors and the method of correcting them.



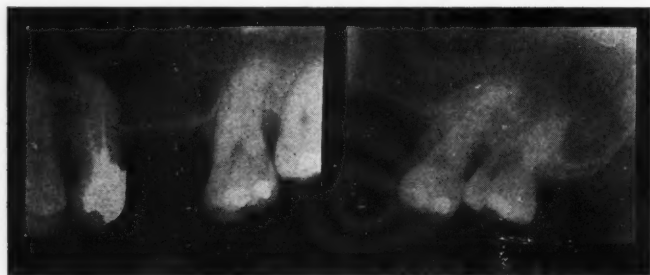
Q. An opinion and recommendation on the conditions above the central incisor would be appreciated, as I am unable to reach a satisfactory diagnosis. The central and lateral incisors were treated and filled several years ago without being radiographed. The area at the apex of the central incisor appears to be a secondary growth of bone where the abscess had been. If this is true, should it be removed? The patient has no pain, and I cannot find external signs of pathology.

A. Apparently the radiopaque area above the central is not bone. Neither sclerotic bone nor condensing osteitis is likely to be as dense in structure as this. The outline in relation to the root of the central incisor is not typical of a repaired periapical involvement. It appears to project slightly into the inferior meatus of the nose, which is not characteristic of condensing osteitis

or even an osteoma. There is a radiolucent line of demarcation around the radiopacity which is not present around dense bone formations.

If it is not bone, the most likely possibility is a supernumerary tooth. Supernumeraries are more common in the maxillary incisor than in other regions, and they are often rudimentary in form and inverted. Studied for evidence of the object being a supernumerary tooth, the density is indicative of a tooth; the upper portion shows a trace of an enamel cap, and the lower half has a longitudinal streak corresponding to the location of the pulp canal. The radiolucent line of demarcation can be identified as the remains of the tooth sac, and the protrusion into the meatus is suggestive of a tooth.

The evidence is sufficiently convincing to conclude that the object is a rudimentary tooth in an inverted position near the apex of the central incisor. Supernumeraries in this location are usually not of clinical importance, and in the absence of suggestive symptoms, it may be disregarded. By placing the film packet with the longest dimension vertically instead of horizontally for examination of the incisor regions, the distortion is reduced and a more extensive view beyond the ends of the roots is obtained.



Q. What is the explanation of the freak radiograph mounted on the right? There appears to be an extra tooth between the two molars. The other view does not show it and it is not visible in the mouth. I tried to use about the same angle for both exposures but placed one film to get the bicuspid and the other for the third molar. Should a different angle have been used for the molars? If so, why does the bone and length of the teeth appear all right, and where could the third tooth in this region be that it did not show in the other picture? Something like this happens often enough to make me wonder how much to depend on the x-ray findings.

A. An accident is the explanation of the ghost tooth, but that is the least of the problems, so more important mistakes will be mentioned first. The radiograph on the right shows the result of the accident, while the one on the left shows the results of the mistakes. About the same angles were used, and the rays were centered at about the same place for both exposures. The angle and centering were correct for the second and third molars but not for the bicuspid. The rays were directed diagonally through the bicuspid which accounts for the images of the roots being distorted and curved mesially, while a profile view was secured of the molars.

The placement of the film packet to include the teeth is only one of several factors essential to securing accurate images of the teeth. The rays must be directed at angles which minimize distortion and present a diagnostic view



of the structures. Diagonal views are usually less reliable for interpretation than profile but are useful in connection with profile views.

Profile views of bicuspid and molars are obtained by directing the rays parallel with the mesial surface of the tooth and at the proper verticohorizontal angle. It is rarely possible to get profile images of the three molars in the same view; therefore, it is necessary to make an exposure for the bicuspid and first molar and another for the second and third molars of either the maxillary or mandibular teeth. There is a difference of about 10 degrees verticohorizontally and 15 degrees mesiodistally in the angles of projection for the first molar region and for the second molar region; so the error in your angle of projection for the bicuspid was about 25 degrees.

Another mistake was in the use of a wood block to retain the film packet. The block would aid in retaining the packet for examination of a mandibular molar region, but it does not place or adapt the packet properly in the maxillary molar region. When the wood blocks are used for the mandibular molar regions, the upper surface should be filed to an incline of about 10 degrees lower on the distal side. The incline permits the teeth to grasp the entire surface instead of just the distal edge and greatly reduces the risk of the block's slipping.

The apparently unimportant detail regarding the form of the block probably was responsible for the accident which led to the difficult interpretation. The cause of the confusing image evidently was a quick forward movement of the block and film packet after about one-fourth of the exposure had been made. A faint outline of the third molar is visible distally to clear image of that tooth, and a fairly clear outline of the second molar is registered mesially to the denser image of that tooth. The appearance of a third tooth was produced by the portions of the teeth which were superimposed on the moved film in contrast with those which were not superimposed. Inspection of the bone definition reveals that it is not all right, but indistinct, which verifies the evidence of movement if additional proof is required.



Q. Do you agree with me that above the incisor region there are at least two supernumerary teeth with an open space between them? This patient has had an uncomfortable feeling in this location for some time, and all of the incisors excepting the one central were removed. In x-raying the teeth, it seems that I have found something which explains the trouble. One of the local dentists who saw this picture said the location was too high for super-

numerary teeth, but they can be most any place in the maxillary bones. At least, I have never seen anything like this before and want advice on it.

A. It is true that misplaced teeth may be found in almost any part of the maxillae and mandible. One which was located at the sigmoid notch carried the quest of the radiodontist to about the limit of the mandible. Before suspecting misplaced teeth or other abnormalities, the anatomic landmarks should be identified. The first step in radiodontic interpretation is to become familiar with the normal range of anatomic variations. This can be accomplished only by studying the records of several hundred general radiodontic examinations or selected specimens from an equally large collection.

The landmarks shown in the illustration are not commonly seen in this view. The lower border of the nasal fossae and the inferior meati are often visible in radiographs of the maxillary incisor region, but the higher structures are seldom registered. Above the usual outlines of the meati in this illustration, the septum is thick and the inferior turbinated bones are shown. The radiopacity and form of the turbinated bones and this septum are not unlike teeth, but the anatomic landmarks must be given precedence.

The foreshortened image of the central incisor indicates that the vertico-horizontal angle of projection was about 10 degrees too high, which is a common mistake made in following the instructions supplied with dental x-ray machines. The angles recommended by one manufacturer for maxillary incisors are 55 to 60 degrees and by another are 50 degrees. This is a ridiculous precaution to avoid elongation of the images because it foreshortens almost all of them, and foreshortened images obscure periapical conditions. The fallacy of these angles is demonstrated by statistics on 1348 examinations which show that an angle above 48 degrees was used only 11 times in registering approximately accurate images of the maxillary incisors. Had the proper angle been used in this examination, the thickened septum and turbinated bones might not have been revealed for misinterpretation.

Even in the foreshortened image, a periapical involvement from the remaining central incisor is evident as a probable source of disturbance in this region. Since this was not mentioned in the inquiry, it may have been overlooked because there was no trace of canal operation. Teeth which presumably are vital should be observed as closely as pulpless teeth, for there is always a possibility of diseased pulps.

# ABSTRACT OF CURRENT LITERATURE

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA  
DENTAL RADIOGRAPHY

BY DR. EDWARD PREBLE, New York City

NUTRITION AND PEDIATRICS

BY SAMUEL ADAMS COHEN, M.D., NEW YORK CITY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

## Orthodontia, Oral Surgery, Surgical Orthodontia, and Dental Radiography

**Fletcherization by Young Children as an Orthodontic Resource.** R. Schönwald (Berlin). *Zahnärztl. Rundschau*, 39: 2, 1930.

The author concludes a serial article on this subject to which his attention was first attracted in 1908 by an article published by W. Zielinski. He at once began to test systematic chewing on his own son aged fifteen months, who was fed on hard food and made to chew it to a thin pulp. The chewing was first carefully supervised, but the child soon acquired the habit and began to chew automatically. The upper dentures are reproduced up to the period of the twentieth year, at frequent intervals, with many measurements of the distances between corresponding teeth to indicate the spread of the jaw. Through the intensive and protracted mastication the milk molars before being shed were ground down to flat surfaces. Study of the measurements showed that spreading of the jaw is completed at a date later than that usually given in textbooks. The author does not intimate that mastication can replace mechanical methods, but the two can reinforce each other. The very young child cannot readily be made to wear retentive apparatus but can be taught to masticate, which is a normal physiologic activity. The author appears to believe that proper spreading of the maxilla at an early period will do away entirely with narrow nasal chambers, small nasal sinuses, deviate septum, high vaulted palate, mouth breathing, nasal voice, etc.; although some anthropologists would doubtless regard these defects as evolutionary and within the range of normal biologic variation.

**Oral Complications of Pregnancy.** A. S. Calman (New York). *The Dental Outlook*, 17: 2, 1930.

This subject, although a trite one, needs to be newly oriented from time to time. The author mentions the pregnancy tumors, so called of the gums, which may stand in some association with the congestion and swelling sometimes seen in menstruation, both due to ovarian dysfunction. There is marked hyperemia

with various degrees of hypertrophy and even the formation of polypoid tumors. In addition the resistance of the gums to infection is lowered, and secondary gingivitis may complicate the picture. The time of supervention is about the fourth month and the affection lasts until after delivery. Caries is common and occurs even in those with good and well-kept teeth, although it is likely that perfectly intact teeth are not often attacked. The salivation of pregnancy may be mentioned in passing as occurring in the first half of gestation but is of little clinical importance. Toothache during pregnancy is not necessarily associated with caries, and care should be taken not to extract sound teeth. The gravid woman should have her teeth examined in any case, scaling should be practiced, and if there are impacted or other teeth which may require extraction, this should be done seasonably. The assertion that pyorrhea can play a rôle in puerperal sepsis justifies treatment of this condition. In theory apical foci should also be dealt with as possible factors in focal infection. Dangers from extraction if any have yielded to painless exodontia. Pregnancy tumors of the gums may require surgical removal, false toothache yields to aspirin, etc., and bromides are of value in salivation. Diet of the gravida should not differ from that of the normal subject. The average gain in weight should be about twenty lb., and this should not be exceeded.

**Relation of Enamel to Dental Caries.** Editorial in *The Pacific Dental Gazette* 38: 1, 1930.

The editor discusses the amount of organic matter in the enamel, recent exhaustive experiments having shown that this is nearly constant for teeth in all ages, the maximum being 0.15 per cent and the minimum 0.14 per cent. In 1896 Tomes concluded as the result of many tests on mankind and animals that under no circumstances was there as much as 0.25 per cent of organic matter, which was virtually negligible. Much of the theoretical aspect of caries has to do with the rôle of organic matter in the enamel, but Sims Wallace and others have reached the conclusion that the causal factors of caries all lie outside of the teeth and that decay is purely an environmental problem. In other words the tooth as such is naturally immune to caries, and no enamel factor can play any decisive rôle in the genesis of the latter. McKay has recently shown that the defect known as mottled enamel does not predispose to caries. The grade of calcification plays no rôle in immunity. When a marked tendency to caries is apparently outgrown, the chances are that this has been due to changes in feeding habits. Wallace points out that late caries may be due to retraction of the gums, in which case it constitutes a sort of substitute for pyorrhea, or rather the latter excludes the development of caries. Apparently proteolytic bacteria show antagonism or antibiosis toward acid forming bacteria, the former giving rise to an alkaline reaction. Dr. Wallace as a result of many years of observation is thoroughly convinced that the chief cause of caries is the lodgement of carbohydrate food débris in the interstices of the teeth and that the chief preventive is cleanliness. If prolonged fever favors the development of caries, it is because of the interruption of the self-cleansing process, involving the suppression of the salivary secretion; and the relative immunity of the diabetic to caries is due to exclusion of carbohydrate from the diet.



**Fatal Case of Noma With Subacute Course.** A. S. Nathan (Brooklyn). *Dental Outlook* 17: 1, 1930.

Cases of noma show much variability owing to the fact that some of them are grafted on earlier lesions. The patient was a boy of ten years who began to suffer with toothache in the latter half of May, 1929. After extraction and drainage an enlarged lymph node was felt in the side of the neck adjacent, and the family physician found that axillary and inguinal glands were also enlarged. The general health began to fail, and as the mandible was still swollen following extraction of the tooth, the author, an oral surgeon, saw the patient for the first time June 29. A blood test showed a leucocytosis of 80000 with very low red cell and hemoglobin. Diagnosis was leukemia or Hodgkin's disease and osteomyelitis of the mandible. Despite all treatment, local and general, the patient became worse. The face became more and more swollen, and four weeks after the first consultation necrosis of the cheek had developed, ending in perforation, the condition being typical of noma. Gangrene continued to spread, and the patient died in coma on August 8. The case is by no means clear. The author holds that the swelling in the cheek which preceded gangrene was not inflammatory but represented one of the leucocytic tumors which help to constitute the picture of the disease while the gangrene was not due to infection but was clearly of mechanical origin due to pressure. A Vincent infection could readily be excluded. The author does not quote from literature but suggests that the relationship, if any, between leukemia and noma should be investigated.

**Sources of the Modern Toothbrush.** C. J. Church (San Francisco). *The J. Am. Dent. Hygienists'* A. December, 1929.

The author, who is a dealer in bristle goods, states that the great majority of dentists and dealers are quite ignorant as to the sources of toothbrush bristles. Many doubtless who understand that hog's bristles are used for the purpose believe that these come from the ordinary barnyard hog, but this is a fundamental error, for they are imported from Russia, China and Mexico, although this latter country supplies only an inferior quality of yellow hue used only for the cheapest brushes. A fine grade comes from the Russian boar hog which has a large snout and bristles which suggest those of the porcupine. The animal is sheared especially for the bristles which vary in length from two to fourteen inches and correspondingly in fineness. Bristles may also be collected in places where the animals have scratched themselves. Commercially there are twelve grades of bristle stock, the best kinds standing straight up without flaring out. Adulteration of good with inferior bristles is practiced to lower the costs. The handles are either hand drawn of bone, or machine drawn of celluloid. Bone handles must be imported from countries where there is cheap labor. In 1922 a duty was imposed on this product and likewise on imported celluloid brushes, so that the domestic manufacturer of the latter has been stimulated, even though he pays a high tariff on bristles and substances which enter into the formation of celluloid. As a result of campaigns for dental hygiene the use of toothbrushes should greatly increase.

**Nutrition and Pediatrics**

**The Development of the Sinuses After Birth.** T. E. Carmody. *Ann. of Otol. Rhinol. & Laryngol.* **38**: 1, 1929.

In a paper presented before the First International Oto-Rhino-Laryngological Congress at Copenhagen, the author makes the statement that "the infant who has reached the age of one year without the so-called acute cold does not exist." He further states that every acute cold involves not only the nasal mucosa but the lining of the sinuses as well, and if this infection progresses into the epithelium, subepithelial tissue, or even to the pericostal covering of the wall, it will be noted radiographically.

Carmody states that infection of the maxillary sinus and ethmoid cells is present very early; such an infection was found even as early as the ninth day of life.

**Sinusitis in Children.** J. Mackenzie Brown. *Ann. Otol. Rhinol. & Laryngol.* **38**: 2, 1929.

In a comprehensive article Brown states that the ethmoid and maxillary sinuses are present at birth. The buds of the second teeth are placed under and lateral to the antra. The author warns against injuring these buds in any procedure in and around the antrum, and he writes that "injury to a tooth bud could easily cause it to be displaced from its normal position in its crypt and prevent its normal development and eruption."

The frontal sinuses are rarely of clinical importance before the eighth year, and the sphenoids have little significance before the third or fourth year.

There are two main types of sinusitis—suppurative and hyperplastic, and the latter type is infrequent in children.

The tonsils and adenoids predispose to sinus infection either by their mechanical obstruction to nasal respiration or by the presence of infection, or both. Poor hygienic surroundings and dietary deficiency, particularly with the fat vitamins, tend to produce a disturbance in antibody formation. Anatomic defects within the nose also predispose to sinus infection. Acute respiratory infections, particularly influenza, are often the immediate cause of sinusitis in children. The author stresses the danger of sinus infection from swimming and more particularly from swimming pools.

Among the more common symptoms is a cough which is more pronounced at night. A low-grade temperature of about 99 degrees or so may be present for weeks and even months. The eyes may show lesions, more commonly conjunctivitis and keratitis. Acute and chronic ear inflammation and complications are not uncommonly found in children with sinusitis. The child sometimes has nephritis or pyelitis as a secondary manifestation. Cardiac lesions and various forms of respiratory infections often manifest themselves also. Acute disturbance of the gastrointestinal tract is a fairly constant experience with some children having a chronic sinus infection.

The diagnosis is made from the history, physical examination of nose and throat, and roentgenogram.

The prophylaxis of sinus infection is the prevention of colds, and vaccines are mentioned as a valuable aid to prevent respiratory infection.

The treatment outlined includes removal of tonsils and adenoids, diet, sunshine and the various "lights," vaccines, removal to warm dry climate, local treatment. Surgical measures are to be discouraged except for the puncture of a small window in the antrum.

Brown states that with adequate treatment the prognosis of sinus infection in children is good.

**Persistent Nasal Catarrh in Children.** Douglas Guthrie. Brit. M. J. 26: 3591, 1929.

In a timely article on a very common infection Guthrie of Edinburgh, Scotland, relates some of his experiences with chronic rhinitis in children. Adenoids are by far the most common cause of chronic rhinitis in children. He also believes that the antra and ethmoids may become infected at an early age, which sometimes requires more vigorous treatment in addition to the removal of the tonsils and adenoids.

He thinks that nasal obstruction is the cause of a persistent nasal discharge in children who show no other apparent cause.

The obstruction arises from an arrested development of the nose and nasopharynx. He blames mouth-breathing for this result, which in turn resulted from a succession of head colds during the first ten years of life.

The object of treatment is to restore potency. This may often be accomplished by the removal of the adenoids and the treatment of any obstruction, for example, a deviated septum or enlarged turbinates.

For removal of the mucopurulent secretion he advises a simple suction apparatus for babies. Older children must be taught to blow the nose (by the open method, not by grasping the nose). Local application should follow the cleansing regimen.

Guthrie thinks that these "catarrhal" children do well by taking sodium bicarbonate internally [dosage not stated—reviewer]. In addition, he stresses the importance of breathing exercises, but he emphasizes the point that both inspiration and expiration should be nasal.

In regard to the dental condition, the author states that "when the upper dental arch is narrow and the teeth crowded, it may be desirable to fit an expanding denture composed of two halves."

**Nasal Discharge in Childhood.** F. Brayshaw Gilhespy. Brit. M. J. 26: 3591, 1929.

This authority reports on fifty children kept under observation for at least two years because of nasal discharge.

Among his conclusions are: first, that pus or mucopus suggests the possibility of sinus infection; second, when dealing with infection of the maxillary antrums in children, the possibility of ethmoid infection at an early age must be kept in mind.

**The Relation of Deficiency Diet to Diseases of the Sinuses.** Lee Wallace Dean. Paper read before fifty-first annual Congress of the American Laryngological Association, May, 1929.

Dean, who has had a rich experience with sinus infection in children, states that the best results in the treatment of chronic nasal sinus disease in children are obtained with proper laryngologic treatment in addition to dietary regulation. Only in the incipient nasal infections are desired results to be obtained by dietetic and hygienic treatment alone. In adults as well as in children is a diet rich in vitamin A indicated when there is sinus disease present.

Dean mentions the experiments of Daniels on rats, who showed that sinus infection could always be produced by a diet deficient in vitamin A. In later experiments she showed that in the early stages of sinus infection in the rat which was produced by deficient diet, the sinusitis could be corrected by suitable diet. Daniels feels that the administration of vitamin B may increase the absorption of vitamin A from the intestinal tract.

The author brings out that the absence of vitamins does not cause infection, but their presence in the diet along with proper hygienic surroundings increases the immunity to the streptococcus which is ever ready to invade and infect the individual.

**Bacteriology of the Tonsils in Relation to Rheumatism in Children.** David Nabarro and R. A. MacDonald. Brit. M. J. 26: 3590, 1929.

According to these English investigators, the streptococci found in tonsils of rheumatic children do not differ in any respect from the streptococci found in children who had no history of rheumatic fever. After reviewing the recent work of many investigators, the authors note that the workers show a considerable diversity of possible causal agents. They feel that the soil, that is the tonsils, is more important than the seed. Nabarro and MacDonald are also inclined to subscribe to the opinion that rheumatic fever may be due to a hypersensitiveness resulting from repeated small doses of toxin which probably came from the tonsil. For this reason they state that "tonsillectomy in rheumatic cases is probably a valuable prophylactic and therapeutic measure."



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## EDITORIALS

### Mouth Breathing and Abnormal Muscular Action

WHEN the study of malocclusion of the teeth was undertaken along scientific lines, it was recognized that certain factors were responsible for the teeth assuming and maintaining a proper position in the dental arch. These factors were referred to as forces of occlusion. Among these forces of occlusion were considered muscular action and atmospheric pressure.

We believe that these two factors are outstanding and contribute more to the etiology of malocclusion than any other factors, with the possible exception of disturbed cell metabolism, although abnormal muscular action and disturbed atmospheric pressure are often responsible for disturbed cell metabolism. When we speak of disturbed atmospheric conditions, we refer to the disturbed atmospheric balance that always occurs in the nasal and oral cavity as a result of mouth breathing.

In normal breathing after speech is completed, the tongue is brought to the roof of the mouth, the mandible drops and the lips are together. Due to the fact that the mouth is closed and the soft palate is against the tongue, it is impossible for air to get in from any point. However, when the mandible drops, a vacuum is created between the tongue and the roof of the mouth. The air attempts to rush in and fill this vacuum. This causes a pressure on the mandibular hyoid group of muscles which pushes on the muscles of the floor of the mouth. This is an example of atmospheric pressure. The mandible is held in a passive position by this pressure. If the lips are separated and the individual breathes through the mouth, the mandible drops, because of its own weight and the weight of the mandibular hyoid group of muscles.

In normal breathing, air passes through the nasal cavity and is warmed to body temperature and moistened to a point of saturation. The air passing through the nasal cavity causes a pressure on the walls of that cavity with each act of inspiration and expiration, similar to the pressure produced by a liquid or gas upon the walls of a tube or pipe through which the substance is flowing. A very slight lateral pressure is produced on these walls during each act of respiration, but as it is continuous, the sum total is considerable. As a result of this breathing the nasal cavity increases in width, the floor of the nose is carried downward, and the growth of the entire denture is thus downward and forward. This downward and forward growth of the maxillary arch is accelerated by abnormal action of the muscles. It is especially true of the orbicularis oris and all muscles associated with it, as well as those elevators of the hyoid muscles and depressors of the mandible which are thrown out of harmony by mouth breathing. When the action of the elevators of the hyoid are interfered with, the depressor muscles of the hyoid are also thrown out of harmony. We find, therefore, that as a result of abnormal muscular action and disturbed atmospheric pressure the body of the mandible is greatly underdeveloped. This is true whether the mandibular teeth have a posterior relation to the maxillary teeth or whether they have a normal anteroposterior relation to the maxillary teeth. In such cases the chin has many times been referred to as receding, when as a matter of fact the chin only appears receding because it has never been developed to its potent size.

Patients with cases of malocclusion associated with mouth breathing and incorrect muscular habits do not seem to present orthodontic problems of unusual difficulty. A mechanical apparatus which will exert the necessary pressure on the malposed teeth to create cell metabolism and to cause the teeth to assume their proper occlusion has been devised. There is, therefore, no doubt that these cases can be treated satisfactorily from a mechanical standpoint. However, we find a large percentage of ultimate failures in orthodontic practice in those cases where the abnormal development to be overcome was associated with abnormal breathing and abnormal muscular action. In fact, it is our belief that no case of malocclusion associated with the two obstacles mentioned can ever be permanently corrected, regardless of how satisfactorily the case has been treated mechanically, unless normal breathing and normal muscular action is established. We can also make a positive statement by saying that if proper breathing and proper muscular

activity is established, cases will show practically no tendency to relapse if they have been treated satisfactorily from the mechanical standpoint.

In the early days of our science, it was customary to have a long period of retention after the major treatment had been achieved, especially in cases that had the added difficulties of mouth breathing and incorrect muscular action. We do not believe that retention is a solution. Even after an indefinite retention the teeth will relapse unless normal muscular habits and normal breathing are established. If these two detrimental conditions are corrected, and the case is treated satisfactorily from an orthodontic standpoint, the period of retention can be dispensed with.

We believe that those cases which require retention are an admission of the fact either that the teeth have been moved too rapidly or that the patient is a mouth breather with abnormal muscular habits. And we say again that normal breathing and normal muscular habits must be achieved before proper occlusion can be assumed and maintained.

## NEWS AND NOTES

### American Society of Orthodontists Meeting in Nashville

The American Society of Orthodontists will hold its twenty-ninth annual meeting at the Noel Hotel, Nashville, Tennessee, April 8, 9, 10 and 11, 1930. An attractive program is being secured, and this meeting should be one of extreme interest to every member of the Society.

A cordial invitation is extended to all ethical dentists who are interested in orthodontia. There will be a registration fee of \$10 for non-members.

Oren A. Oliver, president,  
Nashville, Tennessee.

Charles R. Baker, secretary-treasurer,  
636 Church Street,  
Evanston, Illinois.

### Nashville Program Offers Combination of Business and Pleasure

All is in readiness for making the 1930 convention of the American Society of Orthodontists to be held in Nashville, Tennessee, April 8, 9, 10 and 11, and one of the strongest programs ever to be prepared is being offered with some of the foremost practitioners of America scheduled to appear during the sessions and an entertaining program taking up all idle time has been arranged by Dr. Oren A. Oliver, president of the association, who together with the Nashville members will serve as host to this year's gathering. A most delightful entertainment program has been arranged for the ladies, and the whole promises to be one of the most enjoyable and profitable the Society has ever held.

The new Hotel Noel is doing everything possible to cooperate with Dr. Oliver, and Manager R. E. Hyde announces that early reservations are in excess of his expectations, while those familiar with the organization say that it exceeds any previous registration at this time. The Noel will be headquarters, and all business sessions will be held in the spacious convention hall on the first floor of the hotel.

Nashville's central location, easily accessible from all sections, and splendid railway facilities and good roads are serving to attract members of the Society from all sections of the country. From East and West, North and South, all roads will lead to Nashville during the convention, and Dr. Oliver is expecting this to exceed any previous attendance records and is making his plans accordingly and urges that those finding at the last moment that they can attend, just come on as Nashville hospitality will make itself felt and late comers will find ample facilities for caring for them.

Sunday, April 6, will be registration day for early arrivals and nothing is being planned for that date. Registration proper will begin Monday, and from then until Friday night there will not be a dull moment in the program. Each morning, afternoon and evening is taken up with either business sessions or entertainment, and those attending will be well repaid from either standpoint, according to those who have looked over the program.

Nor are the ladies being overlooked. Dr. and Mrs. Oliver are seeing to it that the ladies attending the convention will not find time hanging heavy on their hands. When the men are busy, the ladies will have something to keep them occupied. Teas, drives,



luncheons, dances and similar events will occupy the time during the off hours, and Nashville is prepared to uphold its traditions for hospitality.

#### PROMINENT MEN ON PROGRAM

Seldom have so many prominent members of the profession been banded together on the program, and papers dealing with subjects of vital interest and importance will be discussed by men who know their business and have had experience in the particular branches they will discuss. With such outstanding men as R. C. Brunfield, B. S. in C. E., who will discuss "Structural Features Related to Orthodontic Materials and Appliances; Dr. Royal Haynes of New York City, Ph.B., M.D., who Tuesday will speak on "The Common Ground of Orthodontia and Pediatrics" and recognized as one of the most outstanding pediatricians of the country; Dr. George Winter, D.D.S., F.A.C.D., of national renown in exodontia, will appear on Wednesday's program discussing "Results of Impacted Third Molars"; Dr. Lafayette B. Mendel, Ph.D., S.C.D., one of the foremost authorities on diet in America, speaking on "Nutrition and Growth"; Dr. T. Wingate Todd, F.R.C.S. Eng., who Friday will discuss "Further Development of Dental Arches"; and other distinguished specialists on other subjects, the program committee has done remarkably well. Scientific sessions will be held Tuesday morning, afternoon and night; Wednesday morning and afternoon; Thursday morning and afternoon and Friday morning and afternoon, all sessions being in the Hotel Noel.

The convention proper opens Tuesday morning with an address of welcome by Hon. Henry H. Horton, governor of the state of Tennessee, and the response coming from Dr. William C. Fisher of New York City, past president of the organization. The report of President Oliver will be submitted at this session, and from then on the meetings will be devoted to scientific discussions, save the time allotted for entertainment.

#### GOLF TOURNAMENT

One of the annual features of the convention is the golf tournament, and Dr. Oliver has not overlooked this. Monday morning at 9 o'clock contestants will begin combat on the beautiful Bellemeade Golf and Country Club course, one of the best in the South. This course will furnish plenty of diversion, with its natural hazards, bunkers and other dreads, as well as its splendid fairways and fast greens, and this annual feature is expected to be one of the high lights of amusement and recreation.

From the standpoint of both the men and women, the high light of the convention will be the annual banquet to be held at the Hotel Noel Wednesday evening. A most pleasing feature of this will be the entertainment program that is to be given by the Nashville Conservatory of Music, under the direction of Signor G. S. deLuca, president of the institution and one of the foremost musical instructors of the country. This conservatory is Nashville's latest addition to its educational section, and in the two years of its existence it has risen to the foremost rank of musical institutions of the country. The program is expected to be one of the most artistic that has ever been given at these annual dinners. The banquet will be followed by the annual dance from 10 P.M. until 1 A.M.

#### LADIES' PROGRAM

The ladies have a most interesting program planned for them with Mrs. Oliver in charge. Tuesday night a dinner and card party will be given at the Hotel Noel, this being intended to occupy the time of the ladies during the night business session that will be held. Wednesday afternoon the ladies will have a tea at the Bellemeade Country Club at 4 o'clock, to be preceded by a drive that will include points of interest in the city, the Parthenon and Nashville's famous educational section. Wednesday night the ladies will attend the annual banquet and dance. Thursday will be taken up with a trip to the Hermitage, the old home of Andrew Jackson, with a luncheon served there. Friday will be left open so the ladies can spend the time in Nashville's shopping district or visiting the points of interest in the downtown district.

From this it can be seen that the Nashville convention promises to be one of the most interesting and enjoyable that the organization has ever held.

## Tentative Program of the Nashville Meeting

TUESDAY, APRIL 8, 1930

*Morning Session*

- 8:00 A.M. Registration.  
 9:00 A.M. Business Session.  
 Address of Welcome—Governor Henry H. Horton.  
 Response—William C. Fisher, New York City.  
 9:30 A.M. President's Address. By Oren A. Oliver, Nashville, Tenn.  
 10:00 A.M. Business Session.  
 Report of Board of Censors—Leuman M. Waugh, chairman.  
 Report of Secretary-Treasurer—Charles R. Baker.  
 Report of Librarian—Abram Hoffman.  
 10:30 A.M. Structural Features Related to Orthodontic Materials and Appliances. By R. C. Brumfield, B.S. in C.E., New York City.  
 Discussed by F. N. Menefee, Ann Arbor, Mich.  
 11:30 A.M. Case Report. By H. C. Metz, Pittsburgh, Pa.  
 12:00 M. Case Report. By Paul D. Lewis, Seattle, Wash.  
 12:30 P.M. Adjournment.

*Afternoon Session*

- 1:30 P.M. Diagnosis and Treatment of Posterior Occlusion. By Milo Hellman, D.D.S., F.A.C.D., New York City.  
 Discussed by Ben Lischer, San Francisco, Calif.  
 4:00 P.M. Case Report. By Allen H. Suggett, San Francisco, Calif.  
 4:30 P.M. Case Report. By E. N. Bach, Toledo, Ohio.  
 5:00 P.M. Adjournment.

*Evening Session*

- 8:00 P.M. The Common Ground of Orthodontia and Pediatrics. By Royal Storrs Haynes, M.D.  
 Discussed by Horton R. Casparis, M.D., Nashville, Tenn.

WEDNESDAY, APRIL 9, 1930

*Morning Session*

- 9:00 A.M. Business Session.  
 Reading of Minutes.  
 Report of Legislative Committee—C. C. Howard, chairman.  
 Report of Orthodontic Legislative Committee—B. E. Lischer, chairman.  
 9:45 A.M. Impacted Mandibular Third Molars. By George B. Winter, D.D.S., F.A.C.D., St. Louis, Mo.  
 Discussed by R. Boyd Bogle, M.D., D.D.S., F.A.C.D., Nashville, Tenn.  
 10:45 A.M. Ethics. By W. A. Bryan, A.B., A.M., M.D., F.A.C.S., Nashville, Tenn.  
 Discussed by Lloyd S. Lourie, Chicago, Ill.  
 11:30 A.M. Case Report. By B. G. DeVries, Minneapolis, Minn.  
 12:00 M. Case Report. An Open-Bite Case—A Partial Result—Why? By W. W. Woodbury, Halifax, Nova Scotia.  
 12:30 P.M. Lunch.

*Afternoon Session*

- 1:30 P.M. The Trend of Orthodontic Treatment. By Frank M. Casto, M.D., D.D.S., Cleveland, Ohio.  
 Discussed by H. A. Pullen, Buffalo, N. Y.  
 2:30 P.M. Case Report. By W. R. Humphrey, Denver, Colo.  
 3:00 P.M. Case Report. By H. C. Pollock, St. Louis, Mo.  
 3:30 P.M. Business Meeting.  
 Committee Reports.  
 Report of Committee on President's Address.

Report of Inter-Relations Committee—William C. Fisher, chairman.  
 Report of Research Committee, Albert H. Ketcham, chairman.  
 Report of Nomenclature Committee—F. A. Delabarre, chairman.  
 Report of American Board of Orthodontia—Albert H. Ketcham, chairman.  
 Nomination of Officers.  
 Selection of Place of Meeting.  
 Adjournment.

- 7:30 P.M. Annual Banquet.  
 Musical program. Short address by Dr. R. Boyd Bogle, President of the American Dental Association.  
 9:30 P.M. Dance.

## THURSDAY, APRIL 10, 1930

*Morning Session*

- 9:00 A.M. Business Session.  
 Reading of Minutes.  
 9:15 A.M. Nutrition and Growth. By Lafayette B. Mendel, Ph.D., Sc.D., New Haven, Conn.  
 Discussed by Edward H. Hatton, Chicago, Ill.  
 11:00 A.M. A Discussion of Infra- and Supraclulsion, Clinton C. Howard, D.D.S., Atlanta, Ga.  
 Discussed by A. LeRoy Johnson, New York City.  
 12:00 M. Case Report. By H. A. Stryker, San Francisco, Calif.  
 12:30 P.M. Case Report. By Joseph D. Eby, New York City.  
 1:00 P.M. Lunch.  
 Luncheon for past presidents and president-elect.

## THURSDAY, APRIL 10, 1930

*Afternoon Session*

- 2:00 P.M.-4:00 P.M. Progressive Clinics.  
 1. Treatment of Neutroclulsion. By E. N. Bach, Toledo, Ohio.  
 2. Class II, Division 2, or Distocclusion, Subdivision. By J. V. Mershon, Philadelphia, Pa.  
 3. Opening the Closed Bite. By L. J. Porter, New York, N. Y.  
 4. Fixed Removable Appliances. By H. C. Pollock, St. Louis, Mo.  
 5. Closing the Open-Bite. By A. H. Ketcham, Denver, Colo.  
 6. Treatment of Missing and of Impacted Teeth. By D. S. Sterrett, Erie, Pa.  
 7. Open-Bites. By C. C. Howard, Atlanta, Ga.  
 4:00 P.M.-6:00 P.M. General Table Clinics.  
 1. Appliances Showing Secure Force Control for Lingual Movement of Incisors and Buccal Movement of Canines and Premolars. By Harvey A. Stryker, Santa Ana, Calif.  
 2. Extraoral Radiographs. By G. L. Turner, Wichita, Kan.  
 3. Subject to be announced. By Harry B. Wright, Philadelphia, Pa.  
 4. Subject to be announced. By A. S. Ashplant, Newburg, N. Y.  
 5. Different Methods of Treatment of Impacted Canines. By E. E. Richardson, San Francisco, Calif.  
 6. A Few Helps in Special Appliances for Individual Cases. By A. C. Gifford, Oshkosh, Wis.  
 7. Photographic Display. By H. L. Parks, Atlanta, Ga.  
 8. Useful Graphs for the Business Side of Orthodontia. By Louis S. Winston, Houston, Texas.  
 9. Subject to be announced. By W. A. McCarter, Topeka, Kan.  
 10. Cast Gold Retainers. By T. W. and H. H. Sorrells, Oklahoma City, Okla.  
 11. Subject to be announced. By F. H. Harrison, Waco, Texas.

12. Blood Control in a Case of Hemophilia. By Wilson R. Flint, Pittsburgh, Pa.
13. Impacted Canines. By Clifford G. Glaser, Buffalo, N. Y.
14. Subject to be announced. By A. Hoffman, Chicago, Ill.
15. Subject to be announced. By Frank Perry, Montgomery, Ala.
16. Subject to be announced. By Claude R. Wood, Knoxville, Tenn.
17. Labial Springs. By A. J. Jackson, Philadelphia, Pa.
18. The Anterior Position of Canine Roots as a Factor in Effecting Retention, and an Efficient Method of Its Correction. By H. B. Robison, Hutchinson, Kan.
19. The Kardex System as Applied to Orthodontic Records. By O. W. Brandhorst, St. Louis, Mo.
20. The Inlay Attachment for Deeply Impacted Canines. By Frank Nicolai, Brooklyn, N. Y.

FRIDAY, APRIL 11, 1930

*Morning Session*

- 9:00 A.M. Business Session.  
Reading of Minutes.
- 9:15 A.M. Further Development of the Dental Arches. By T. Wingate Todd, F.R.C.S. (Eng.), Cleveland, Ohio.  
Discussed by Milo Hellman, New York City.
- 11:00 A.M. Diagnosis and Treatment of Anterior Occlusion. By Alfred P. Rogers, D.D.S., Boston, Mass.  
Discussed by William E. Flesher, Oklahoma City, Okla.
- 12:00 M. Case Report. Treatment of Adult Open-Bite Cases by Grinding Occlusal Surfaces of Posterior Teeth. By Herbert A. Pullen, Buffalo, N. Y.
- 12:30 P.M. Lunch.

*Afternoon Session*

- 1:30 P.M. Case Report. By B. E. Lischer, San Francisco, Calif.
- 2:00 P.M. Diagnosis and Treatment of Neutroclusion. By Martin Dewey, M.D., D.D.S., F.A.C.D., New York City.  
Discussed by A. Hoffman, Chicago, Ill.
- 4:00 P.M. Business Meeting.  
Installation of Officers.  
Inaugural Address. By Harry E. Kelsey, Baltimore, Md.  
Adjournment.

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**The American Board of Orthodontia**

A meeting of the American Board of Orthodontia will be held at the Noel Hotel, Nashville, Tennessee, on April 7, 1930, beginning at 9 A.M.

Those orthodontists who desire to qualify for a certificate from the Board as outlined in the article entitled, "The American Board of Orthodontia," Page 50, January issue of the INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY, may receive full information and application form from Dr. B. Frank Gray, Secretary, 209 Post Street, San Francisco, California.

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**St. Louis Study Club of Dentistry**

The St. Louis Study Club of Dentistry was established for the purpose of teaching advanced dental subjects to ethical dentists, without charge. This organization, founded in 1919 and in continuous operation since that time, has completed its twelfth annual term. The occasion will be marked by a clinic and dinner at the Hotel Chase, Kingshighway at Lindell Boulevard, on Wednesday, April 2, 1930.



The clinic, which will start promptly at 3 o'clock, will consist of the following subjects: dental ceramics; oral prophylaxis; fixed bridge technic; rizadontia (root canal technic); anatomy and dissection of the head; tooth form and cavity preparation; dental roentgenology; full dentures; dental economics; conduction and local anesthesia; crown and inlay casting technic; oral diagnosis and diseases of the mouth; ultraviolet light and its application to dentistry.

At the conclusion of the clinic, a dinner will be given at 6:30 o'clock as a tribute from the students to their instructors. Ethical members of the profession are invited to attend both the clinic and dinner.

Bulletins descriptive of the study club may be had by addressing Dr. F. C. Rodgers, 903 Missouri Theater Building, St. Louis, Mo.

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#### **Testimonial Dinner to be Held in Boston**

In appreciation of his contribution to the profession during fifty years of practice there will be a testimonial dinner tendered to Dr. James H. Daly, at the New University Club, Boston, Mass., on Wednesday, March 12, 1930.

EDWARD F. SULLIVAN, D.M.D., Secretary of Committee,  
520 Beacon Street, Boston, Mass.

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#### **Missouri State Dental Association to Meet in St. Louis**

The 1930 meeting of the Missouri State Dental Association will be held in St. Louis, May 19, 20, 21, and 22, at the Hotel Jefferson.

Dr. E. H. Keys, the president, in conjunction with the various committees, is outlining an unusual program. The entire dental profession is invited to attend the meeting.

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#### **The New York State Dental Hygienists Annual Meeting**

The New York State Dental Hygienists Association will hold its tenth annual meeting, May 13 to 16 inclusive, at the Hotel Commodore in New York City. An interesting literary and clinical program is being arranged, and a cordial invitation to attend any or all sessions of this meeting is extended to members of the dental profession, dental hygienists and dental assistants. Members of this organization are urged to cooperate by being in attendance. It is earnestly hoped that interest in membership may be stimulated among nonmember dental hygienists.

Preliminary programs will be mailed to all members about April 15. Watch for further announcements.

BLANCHE A. DOYLE, Corresponding Secretary,  
New York City.

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#### **The Society for the Advancement of General Anesthesia in Dentistry**

The next meeting of the Society for the Advancement of General Anesthesia in Dentistry will take place on Monday night, April 21, 1930 at 7 P.M. at the hotel Buckingham, 101 W. 57th Street, Corner of Sixth Avenue, New York City.

The scientific session will be devoted to a discussion on Ethyl Chloride, by Dr. Joseph Stovin of the Otolaryngological Service at the Polyclinic Medical School and Hospital, and

of the Hospital for Joint Diseases. Dr. Stovin is a Fellow of the American College of Surgeons, and can speak with authority on a vast experience with ethyl chloride, from the standpoint of its availability as a general anesthetic for minor operations.

LEONARD S. MORVAY, D.D.S., Secretary,  
76 Clinton Avenue, Newark, N. J.

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#### **The European Orthodontological Society**

The European Orthodontological Society will hold its sixteenth annual meeting at the Zurich Dental Institute, Zurich, on June 9 and 10, 1930. A cordial invitation is extended to all members of the profession interested in Orthodontics to attend the meeting.

For further particulars apply to the secretary.

HON. A. C. LOCKETT, Secretary,  
75 Grosvenor Street, London, W. I.

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#### **Notes of Interest**

Dr. Edward A. Moeller announces the removal of his office from the Pontiac Bank Building to Suite 710, Riker Building, Detroit, Michigan. Practice limited to orthodontia.

Dr. Lillian Boldemann announces the removal of her offices to Suite 800, Butler Building, 135 Stockton Street, San Francisco, Calif.

Dr. Landis H. Wirt announces the removal of his office to Suite 1002, Building and Loan Tower, South Bend, Ind. Orthodontia exclusively.

Dr. Miles B. Chelimer announces the removal of his office to 200 West 59th Street, corner Seventh Avenue, New York City.

Dr. Henry D. Cossitt announces the opening of his office for the practice of orthodontia exclusively at 807-810 Nicholas Building, Toledo, Ohio.

Dr. William J. Childs, formerly associated with Dr. W. B. Childs of Macon, Georgia, announces the opening of his office for the exclusive practice of orthodontia in the Swift-Kyle Building, Columbus, Georgia.

